# REPORT

ON

# THE BENGAL CIVIL FUND,

INCLUDING

# VALUATIONS,

AS AT

31ST MARCH 1873, AND 31ST MARCH 1878.

BY

WILLIAM SUTTON,

ACTUARY TO THE REGISTRY OF FRIENDLY SOCIETIES.

LONDON:

CHARLES AND EDWIN LAYTON,

150, FLEET STREET,

1879.

PRINTED BY

CHARLES AND EDWIN LAYTON,

FLEET STREET, GOUGH SQUARE, AND GRAND JUNCTION STREET, E.C.

# INDEX.


| CHAP. | | PAGE |
|---|---|---|
| I. | Introductory | 1 |
| II. | General Statistics | 9 |
| III. | Mortality Experience of the Members and their Wives | 13 |
| IV. | Mortality Experience of the Sons of Members | 23 |
| V. | As to Retirements | 27 |
| VI. | Average Salaries of Members, and the Subscriptions payable | 29 |
| VII. | On the Valuation of Subscriptions | 37 |
| VIII. | Potential Benefits, and corresponding Additional Subscriptions | 40 |
| IX. | Valuation as at 31st March 1873 | 45 |
| X. | Examination of Experience, from 1st Jan. 1873, to 1st Jan. 1878 | 54 |
| XI. | Valuation as at 31st March 1878 | 56 |
| Appendix | | 77 |

# INDEX TO APPENDIX.


TABLE. PAGE

I.—Members' Mortality Table, as deduced from the Experience of the Fund, 1850-1872, together with D and N Cols., and curtate Annuity Values at 8 per cent. and 5 per cent. respectively ... ... ... 78

I.(A)—Values of Ordinary Subscriptions, Active and Retired, at 8 per cent. ... 79

II.—Values of Incumbent Benefits to Sons, deduced from the Experience of the Fund, 1850-1872, at 8 per cent. and 5 per cent. ... ... 80

III.—Values of Incumbent Benefits to Daughters, deduced from the Experience of the Fund, 1850-1872, at 8 per cent. and 5 per cent. ... ... 81

IV.—Values of Marriage Portion to Daughters, deduced from the Experience of the Fund, 1850-1872, at 8 per cent. and 5 per cent. ... ... 83

V.—Rates of Mortality and Marriage for Bachelors, as deduced from the Experience of the Fund, 1850-1872, and the Values of Reversionary Annuities to their future Wives at 8 per cent. and 5 per cent. ... 84

VI.(A)—Values of Reversionary Annuities to Members' *present* Wives at 8 per cent. and 5 per cent., and of corresponding Additional Subscriptions at 5 per cent. ... ... ... ... ... ... ... ... 85

VI.(B)—Values of Reversionary Annuities to Members' *present and future* Wives at 8 per cent. and 5 per cent., and of corresponding Additional Subscriptions at 5 per cent. ... ... ... ... ... ... 86

VII.—Logarithms of Ordinary and Additional Subscriptions used in the calculation of the Value of Future Subscriptions ... ... ... ... 87

VIII.—Values of Incumbent Pensions to Widows at 8 per cent. and 5 per cent ... 88

IX.—Values of Contingent Benefits to Sons of Members at 8 per cent. and 5 per cent., and of corresponding Additional Subscriptions at 5 per cent. ... ... ... ... ... ... ... ... 89

X.—Values of Contingent Benefits to Daughters of Members at 8 per cent. and 5 per cent., and of corresponding Additional Subscriptions at 5 per cent. ... ... ... ... ... ... ... ... 95

XI.—Values of Contingent Benefits to future Children of Bachelors at 8 per cent. and 5 per cent., and of corresponding future Additional Subscriptions at 5 per cent ; also Values of Bachelors' future Additional Subscriptions in respect of future Wives at 5 per cent. ... 105

XII.—Values at *Time of Marriage* of Contingent Benefits to future Children of Bachelors at 8 per cent. and 5 per cent., and of corresponding Additional Subscriptions at 5 per cent. ... ... ... ... 106

# REPORT

ON

# THE BENGAL CIVIL FUND.

By WILLIAM SUTTON,
ACTUARY TO THE REGISTRY OF FRIENDLY SOCIETIES.

*To the Managers of the Bengal Civil Fund.*

## CHAPTER I.

### Introductory.

Gentlemen,

The Investigation I have the honour to lay before you on the affairs of the Fund, was originally entrusted, in 1874, to the late Mr. Samuel Brown, of the Guardian Life Office, but, in consequence of his death in 1875, the papers were handed over to Mr. Ralph Price Hardy, of the London and Provincial Law Assurance Society. Owing to the pressure of other engagements, and the extreme complication of the work, Mr. Hardy desired that another Actuary should be employed in conjunction with him; and accordingly in January 1878, at an interview between Mr. Hardy, Mr. Harrison (as your representative in England), and myself, it was arranged that the work should be carried on to completion, as speedily as possible. Unfortunately, Mr. Hardy subsequently found that his engagements would greatly interfere with his giving that consideration to the subject which its importance required, as will appear from the appended letter to the Managers of the Fund, from Mr. Hardy, and the present Investigation and Report have, in consequence, been made entirely by myself.

I need scarcely say, that the loss of Mr. Hardy's valuable co-operation and advice is a matter for much regret.

London and Provincial Law Assurance Society,
21, Fleet Street, 25*th June* 1879.

*To the Managers of the Bengal Civil Fund.*

Gentlemen,

A continued and severe pressure of professional engagements having prevented my giving my full share of that complete and uninterrupted attention to the present reference, which its complicated and highly responsible nature demanded, the whole Investigation has been carried through by my friend, Mr. Sutton, who has devoted a most unusual amount of personal labour and time to the numerous and difficult questions which arose at every point of the inquiry, and called for the constant exercise of a considerable and varied professional knowledge for their solution.

Under these circumstances, I have deemed it more respectful to the Managers of the Fund, and fair to Mr. Sutton, that the Report should appear under his sole signature; and I trust that the reasons that induce me to take this course will commend themselves to the Managers.

I may add, that I have from time to time examined, with Mr. Sutton, the main statistical results obtained from the specially planned and comprehensive re-scheduling of the data, in order to elicit both the true meaning to be attached to the same as representing independent circumstances, and the modifications they might exercise over the co-related events when in combination; and I desire to accept with Mr. Sutton the full responsibility of the several deductions, and of the methods thereon based and actually used in the Valuation.

Mr. Sutton's association with me in this reference has been a source of great satisfaction to myself; and I feel that the affairs of the Fund have undergone, at the hands of Mr. Sutton, a scrutiny of the most searching nature, and one moreover based upon true scientific principles, and conducted throughout with a professional skill that will be apparent to all competent observers.

In conclusion, I desire to express my sincere acknowledgments for the confidence reposed in me by the Managers of the Fund, and for the patient indulgence they have extended to me under the repeated disappointments they suffered through my inability to complete the reference entrusted to my care.

I am, Gentlemen,
Your very faithful Servant,
RALPH PRICE HARDY,
*Actuary.*

*To the Managers of the Bengal Civil Fund, Calcutta.*

As is subsequently stated, the information as to Invalid Retirements did not enable me to deal with this question.

As regards the Claim of Government for the transfer of a certain part of the capital of the Fund from the 8 per cent. to the 5 per cent., and the surrender of a small amount of it, it has not been attempted to express any definite opinion, for the reason stated in Chapter XI.

Many of the points raised in Mr. Westland's Examination of the Bengal Civil Fund, 1872, will be found to have been considered in this Investigation, although not generally specifically alluded to. Indeed, it may be said once for all, that Mr. Westland's criticisms and suggestions, as contained in the "Examination" and other papers, have been found to be of the greatest service; and similar remarks apply to the papers written by Mr. Monteath, as far as I have had opportunity to consider them.

The fact that at present interest is allowed at the rates of 8 per cent. and 5 per cent. on the funds of the Ordinary and Additional Branch respectively, payable half-yearly, has been fully considered in Chapter XI.

It will be seen that, in other respects, the instructions contained in the Reference have been, as far as practicable, carried out.

A complete set of new tables has been computed, based, it may be said, throughout on the actual Experience of the Fund, between 1850 to 1872 inclusive. Not only have the rates of mortality and marriage among Members been investigated, but also the rates of mortality and marriage among the children and widows.

Full consideration has been given to the important questions of re-marriages of Members, and of average salaries for subscription purposes, and the effect of retirements has also been investigated. In addition, the tables have been so arranged, as to show for each benefit, not only its value, but the value of the corresponding subscription,—a distinction being made between active and retired subscriptions.

Finally, it should be stated, that the Valuations as at 31st March 1873 and 31st March 1878, have been made entirely from the tables annexed to this Report.

It has been thought desirable to append copy of the printed Letter of Reference, originally forwarded to the late Mr. Brown.

## REFERENCE TO ACTUARY.

The Bengal Civil Fund is a Fund subscribed to by the Members of the Bengal Civil Service, they being bound by their covenant of service to become Members of it. Their subscriptions are paid at so much per cent. of their salaries, and the benefits they receive from the Fund are pensions and allowances to their wives and children who survive them.

The history of the Fund is narrated in the first three articles of the "Examination," quoted as No. 8 in the List of Documents attached.

### Constitution of the Service so far as it affects the Fund.

The Service, whose Members are Members of the Fund, is recruited almost entirely in England, and by competitive examinations, and the Members come out to India at the age (at present) of about 22.* Up to about 1856, it was recruited otherwise than by competitive examination, and the Members then used to come out at about 19 years of age, sometimes even earlier. Since then the average age has increased.

The period of Service required before retirement is 25 years, of which 21 must be passed in India, and the rest may be furlough in Europe, each Member being entitled to one year of furlough in Europe for each four years of Service in India. After the above period of Service the Members may retire, when they like, upon a pension of £1,000 a year. And ordinarily, they are compelled to retire on completion of 35 years' Service. Up till 1870, there was a slight inducement to remain in Service for a few years after the 25, because the pension was in most cases, to a small degree, dependent on the length of Service; but since 1870, the pension available is exactly the same at whatever time the Member retires, and there is not the same inducement to remain. The advantage of a high salary (£3,000 or £4,000), which most men of that period enjoy, affords, however, sufficient inducement to prolong Service, and the average period of Service after which men take pension is, at present, about 29 years.

Retirements on bad health may take place, on a smaller pension, at any time during the required period of 25 years' service.

---

* The Actuary will understand that these and similar figures are merely used for the purpose of this general statement of the case; and that in his calculations he should proceed upon the actual statistics given him, and not accept these figures as authoritative.

The Members of the Service occupy the principal civil and administrative appointments in Northern India. The greater number are distributed, as soon as they arrive in India, to the three Provinces, Bengal, North-Western Provinces, and the Punjaub, and beginning with salaries of £480 a year, rise, by gradual promotion, regulated in a great measure by seniority, to higher salaries. One or two may rise to annual salaries of £10,000; a few may rise to £5,000, but nearly every person, if he remains long enough, will rise to £3,000.

The three cadres of promotion, in the three Provinces, Bengal, the North-Western Provinces, and the Punjaub, are perfectly independent of each other. Contemporaries in the regular line of promotion in the same Province will be found drawing salaries not very different from each other, but their contemporaries in another Province may be drawing a very different scale of salary, through the promotion having been slower or quicker in one Province than in another.

It has been said that the bulk of the Service is thus distributed. The remainder are some civilians in other Provinces (Central Provinces, Oudh, &c.), doing the same work, but on a different roster of promotion; and a few appointed to special posts (on the staff of Government, for example), or selected for high offices.

As mentioned above, these Members of the Service subscribe to the Fund, during their whole service, the following being the rates of subscription:—

(*a*).—A general subscription of $2\frac{1}{2}$ per cent. all round.

(*b*).—A subscription paid by those who have wives living, of 2 per cent.

(*c*).—Subscriptions for children, of $\frac{1}{4}$ per cent. for each daughter, and $\frac{1}{8}$ per cent. for each son. Widowers pay double subscriptions for children

The subscription for wives and children is not compulsory, but of course it is paid by every Member, in the same way as if it were. As benefits are not given to daughters after they marry, or to sons after they attain 21 years of age, subscribers cease to pay the special subscription for the daughter or son who so marries or comes of age, and Members occasionally cease paying for sons a year or so before they come of age, thinking the chance of benefit not worth the cost.

Members retiring from the Service, have the option of keeping up their connection with the Fund, or of ceasing to have any connection with it.

In the former case, they must make up the total at their credit on the Fund books under Article 8. The sums now received on this account are not much, and are chiefly payments by those who retire on invalid pension, as most people who have been paying subscriptions for 25 years have, with the accumulated interest, Rs. 25,000 to their credit.

Thereafter, they must pay subscriptions at half rates upon their annuities; it used to be whole rates, but since 1870 it has been reduced to half, except for Members who marry after retirement. Retired Members, however, are allowed to compound by paying a lump sum in lieu of all subscriptions.

As stated above, a Member when he retires may cease to belong to the Fund and need pay no subscriptions. Hardly any adopt this course except those who retire *very* early on invalid pension, and thus would have a large sum to make up; or annuitants who have no family, and don't intend to marry.

It remains to state the number of the Service, which on 31st March 1873, contained—

623 active or non-retired Members, including three native Members of the Service, (*see* Proceedings of Meeting of 29th July 1873.)

128 subscribing retired Members.

71 compounded retired Members.

29 retired and ceased to keep up any connection with the Fund.

32 who were Members of the old Fund but did not join the new one; of these, 6 kept up their interest, after retirement, in the old Fund, and 26 did not do so.

## Constitution of the Civil Fund.

The great bulk of the income of the Fund is the result of subscriptions paid by Members serving in India; these are paid monthly, and are collected by Government without expense to the Fund. Government collects them by deducting the amount from the monthly pay bills, discharged on the first day of the month succeeding that for which salary is drawn.

The Fund is kept in the hands of Government, which pays interest upon it from the date on which it receives the amounts as just stated; but since Government pays interest at two different rates, the Fund is thereby split up into two different branches.

The first is called the Ordinary Branch, and receives the 2½ per cent. general subscription. Upon the accumulations of this branch, Government gives 8 per cent. interest, payable half-yearly.* The half-yearly payments are due on April 1st and October 1st of each year, on the investments that have been made since 1866, but on the earlier investments they are due on May 1st and November 1st, and these half-yearly receipts by interest are again paid over to Government, and held at the same interest.

The other branch is called the Additional Branch,† and receives the special subscriptions for wives and children. Upon this branch the Government pays 5 per cent. interest half-yearly, on April 1st and October 1st, the payments of interest being again held by it at the same rate.

The distribution of the other receipts of the Fund between the two branches is noted in Article VIII. of the Examination, the slight alterations proposed in which the Actuary may regard as accepted.

The distribution of the charges between the two branches of the Fund is a more complicated matter. The general question is discussed at length in Articles 3 and 4 of the Examination of the Bombay Fund, and in other parts both of that Examination and of the Examination of the Bengal Fund. It is a question which has to be finally settled by the Government and the Managers of the Funds. The principles set forth in these papers have so far been adopted both by the Government and by the Managers of the Bengal Fund, and the calculations regarding the position of the Fund should, for the present, be made on the hypothesis that the charges will be distributed between the two Funds in the proportions fixed on these principles. But the Managers request that the Actuary will express a free and full opinion upon these questions of principle also.

---

* Amounts received during each half-year are held at 8 per cent. interest till the end of the half-year.

† The names ordinary and additional are derived from the fact that the "ordinary" contains the subscriptions which are supposed to represent the income of the Fund in its old form before 1850; and the "additional" those that were then added.

## Objects of present Reference.

The first object of the present reference is to obtain from the Actuary a complete report upon the state of the Fund.

The Managers desire that a complete set of new valuation tables be drawn up. The tables at present in use were drawn up in 1863-65, partly upon the basis of the experience of the Fund up till that time, and partly upon still older data; but it is desired that the tables should now be revised with reference to the actual and the ampler experience of the Fund up till 31st March 1873. It is believed that, with reference to the changed circumstances of Indian life, and the altered conditions of the Service, the experience of the later years is a safer guide than that of earlier years in such matters as mortality, marriages, and income of Members; and, indeed, the improvement of life in India has been more than once pointed out by Actuaries in their investigation into Indian funds. For these reasons, a re-investigation of the data is required, and it will be for the Actuary to say to what extent, and in what particulars, the results of that re-investigation demand a change in the data on which the present tables are founded.

Though data are furnished which come down from the beginning of the century, it will be for the Actuary to say whether the older data should not be entirely left out of account.

On one or two points the present tables are believed to be deficient. For example, they do not take into account the fact that the interest on both funds is realizable half-yearly.* Another objection to these tables is, that they involve the inconsistent experiences of different periods. For example, the rate of mortality for husbands is taken from the experience of the year 1801 to 1858, while that of wives is taken from tables given by Mr. Davies in 1851, as having been prepared by him for the Bombay and Madras Military Funds. So bachelors' life-experience is based on facts from 1801 to 1858, but their marriage experience is taken from the facts of 1850 to 1863. The rate of mortality for children, also, has not been taken from the actual experience of the Fund, or from any recent experience at all, and is, perhaps, entirely inappropriate to present circumstances. On all these and similar questions it will be for the Actuary to say whether the result of the present investigation of the facts affords sufficient grounds for the adoption of figures different from those now in use as the basis of the calculations.

The rate of income—that is, of anticipated subscription—of Members, taken in the subscription valuation tables, seems, for similar reasons, to be an inaccurate one. It was based on the facts of a single date, April 30th 1863, and the assumption was made that Members would generally reach the same salaries for age that were reached by subscribers on that date. Two causes, however, have operated towards the reduction of salary for age; in the first place, the more numerous additions to the Service during recent years, by enhancing the number of persons waiting for promotion, has diminished the rate of promotion for each person; in the second place, as Members enter the Service now about two years older than formerly, they are, at each age, of about two years' less standing in the service. Whether, and to what extent, these causes of diminution of salary have been counteracted by other changes, is a question on which there is much diversity of opinion. The facts, as to salary, of 1863, and of 1873, are placed in the Actuary's possession, and it will be for him to advise us to the best means of valuing the future subscriptions.

---

* This fact, as regards the 8 per cent. fund, has been pointed out and allowed for in the valuations made in the "Examination." As regards the 5 per cent. fund it is of much less importance, the allowance being perhaps only 20,000 to 30,000 Rupees, and it is not taken into account. It should be so, of course, when new tables are made.

One method of calculating these values, on the basis of present salaries, the Actuary will find proposed in Article IV. of the Examination, and carried into effect in Mr. Westland's Memorandum of June 23rd last.

The Managers wish to have the values, separately, of subscriptions to be paid from salaries during Service, and of those to be paid from annuities after retirement. Also, they wish in the additional Fund to have the value of Members' future subscriptions on account of wives, sons and daughters, separately valued. *See* page 111 of the "Examination."

The tables given in the Actuary's Report of 1865 did not attempt any distinction between subscriptions from salary and subscriptions from annuity. This division has been made in the Memorandum of June 23rd just quoted. But as there made, the assumption has been taken that every Member served out his full time, and none retired on invalid pension. The reason of this omission was, that retirements on invalid pension, though they cause a loss of income by subscription (compared with remaining in Service), appear also to cause considerable decrease in liabilities. Some who thus retire withdraw from the Fund entirely; others keep up only a partial interest; and, in most cases, a heavy subscription is required to make up the maximum.

The facts, in this respect, of the invalid retirements since 1850, are placed at the Actuary's disposal, and it will be for him to say in what way they should be taken into account in the valuation of subscriptions.

It has been said above, that the promotion in the three branches of the Service (Bengal, North-Western Provinces, and Punjaub) is not parallel. It is right to inform the Actuary that there is very considerable agitation at present among the junior civilians in the North-Western Provinces, who allege that their position and prospects, as regards salary, are considerably worse than those of their brethren in other Provinces. It will be for the Actuary to say, with reference to the facts, whether it would be safer to frame different subscription value tables for the different Provinces, or whether it is sufficient to take one, an average one, for the whole Service.

In any case, the question of the valuation of future subscriptions should, both by reason of the largeness of the item, and on account of its complication, have the best attention of the Actuary.

The Actuary will, no doubt, consider the criticisms on minor points in Mr. Brown's valuations, which are contained in Article IV. of the Examination

If, as the Managers anticipate, the result of the Actuary's valuation should be to show that there is a considerable surplus in the Fund, the Managers next request the Actuary to afford an estimate of the cost of the various proposals that have been made for the utilisation of the surplus, by increasing the benefits or by diminishing the subscriptions; and they desire also, that he should state what particular methods appear to him to involve the greatest amount of benefit to Members, accompanied by the smallest amount of loss to the Fund. He should advise also, how much of a margin it would be safe to keep, in distributing the surplus.

The recent papers of the Fund (specified in the margin) will be a guide to the Actuary, as to the details that are wanted in respect of this subject of reference; and further information will be sent as to the opinions of the Service, when they are collected.

Managers' Circulars of March 25th, May 21st, and August.

Proceedings of Meeting of July 29th, 1873.

Two Memoranda by Mr. Westland, dated May 5th and June 23rd.

The Managers further desire to have the opinion of the Actuary regarding the claim of Government for a transfer of a certain part of the capital of the Fund from the 8 per cent. to the 5 per cent. branch, and the surrender of a small amount of it. They desire to have his opinion both as to the question of principle upon which it is based, and as to the amount at which it is estimated in the Examination.

Any general remarks or instructions by the Actuary on points of interest in the management of the Fund, especially on questions touched on in the Examination, will be gladly received by the Managers.

## LIST OF DOCUMENTS.

Reports upon the Fund.

1.—By Mr. Davies, 1850.
2.—By Mr. Neison, 1852.
3. Mr. Monteath's "History," 1863.
4.—Mr. Brown's First Report, 1865.
5.—Mr. Monteath's Remarks thereon, 1865.
6.—Mr. Brown's Second Report, 1867.
7.—Mr. Brown's Third Report, 1870.
8.—Mr. Westland's Examination of the Bengal Civil Fund, 1872.
9.—Do. of Bombay Civil Fund, referred to in above, 1871.
10.—Proceedings of the Fund Meetings, from 1850 to 1873.
11.—Details of the present Valuation for March 31st 1873.
12.—Valuation Statement for March 31st 1873.
Do. revised, on latest information.
13.—Civil Gradation List of 1st April 1873.

## LIST OF PAPERS PREPARED AS BASIS FOR ACTUARY'S RE-EXAMINATION OF DATA.

14.—Statistical Register of Members of the Bengal Civil Service, who entered the Service in 1791 and subsequent years *(manuscript volume)*.
15.—Statistical Register of Families of Subscribers belonging to the Service, on or after 1st January 1850 *(manuscript volume)*.
16.—Statistical Register of incumbents admitted under the new Rules *(manuscript volume)*.
17.—Nominal List of present Members of the Fund, active and retired, with their Families, retaining an interest on the Fund.
18.—Rules of the Fund, with latest revisions.
19.—Subscriptions paid by Members, active and retired, in 1872-73.

## CHAPTER II.

### General Statistics.

With the view of making a complete investigation into the experience of the Fund, as far as the materials furnished would enable this to be done, the necessary particulars were taken out on cards, a single card being used for each Member.

After these cards had been written out and examined, the first step taken was to classify the Members, in the manner indicated in the accompanying Table A. Each of these classes was then analyzed, in the manner indicated in Table B.

Table A.—*Showing the respective Positions of Active Members on* 1 *January* 1850, *or subsequent Entry, and on leaving the Fund, or at* 31 *Dec.* 1872.

| Position in 1872, or on Leaving the Fund. | Entered Service before 1850. Position at Beginning of 1850. | | | |
|---|---|---|---|---|
| | Bachelors. | Married once. | Widowers once. | |
| Bachelors | (1) 87 | | | |
| Married once | (2) 108 | (3) 188 | | |
| Widowers 1st | (7) 9 | (6) 29 | (8) 13 | |
| Married twice | (4) 19 | (5) 22 | | |
| Widowers 2nd | (10) 1 | (11) 1 | (9) 1 | |
| Married thrice | (12) 1 | | | |
| | 225 | 240 | 14 | Total 479 |
| | Entered Service in or after 1850. | | | |
| | Bachelors. | Married. | | |
| Bachelors | (A) 318 | | | |
| Married once | (B) 263 | (C) 40 | | |
| Widowers 1st | (D) 16 | | | |
| Married twice | (E) 14 | (F) 8 | | |
| Widowers 2nd | | | | |
| Married thrice | (G) 1 | | | |
| | 612 | 43 | | Total 655 |
| | | | | 1,134 |

TABLE B.—*Analysis of various Classes in previous Table A.*

| Class. | Left. | | Died. | | Existing at end of 1872. | | Total. |
|---|---|---|---|---|---|---|---|
| | Retired. | Active. | Retired. | Active. | Retired. | Active. | |
| **ENTERED SERVICE BEFORE 1850.** | | | | | | | |
| (1) | 23 | 15 | 3 | 19 | 22 | 5 | 87 |
| (2) | | 2 | 8 | 26 | 34 | 38 | 108 |
| (3) | 7 | 2 | 32 | 39 | 88 | 20 | 188 |
| (4) | ... | ... | ... | .. | 7 | 12 | 19 |
| (5) | ... | ... | 2 | 1 | 16 | 3 | 22 |
| (6) | . | ... | 12 | 3 | 12 | 2 | 29 |
| (7) | 1 | ... | 1 | 1 | 4 | 2 | 9 |
| (8) | 4 | ... | 1 | 5 | 3 | .. | 13 |
| (9) | ... | ... | .. | ... | ... | 1 | 1 |
| (10) | ... | ... | ... | ... | . | 1 | 1 |
| (11) | ... | ... | ... | ... | 1 | . | 1 |
| (12) | ... | ... | ... | ... | 1 | . | 1 |
| | 35 | 19 | 59 | 94 | 188 | 84 | 479 |
| **ENTERED SERVICE IN OR AFTER 1850.** | | | | | | | |
| (A) | ... | 26 | .. | 48 | 1 | 243 | 318 |
| (B) | ... | 3 | 1 | 16 | 6 | 237 | 263 |
| (C) | ... | 3 | ... | 2 | ... | 35 | 40 |
| (D) | ... | ... | ... | 3 | ... | 13 | 16 |
| (E) | ... | 1 | ... | 3 | .. | 10 | 14 |
| (F) | ... | .. | ... | ... | ... | 3 | 3 |
| (G) | ... | ... | ... | . | . | 1 | 1 |
| | ... | 33 | 1 | 72 | 7 | 542 | 655 |
| TOTAL . | 35 | 54 | 60 | 166 | 195 | 626 | 1,134 |

This method of classification was found to be, throughout the investigation, of great service, as it afforded a ready check upon many of the results subsequently obtained. It will be observed that in the above Tables, and in the following Tables, those Members who had retired before 1850 are not included.

The following Tables I. and II. will serve to show the changes in the number and in the position of the Members, without any regard to the financial bearing of such changes upon the Fund. It should be stated, in connection with these Tables, that although every endeavour has been made to render them as accurate as possible, yet there is reason to believe that in some respects, not, however, very important, they cannot be accepted as absolutely correct, owing to the imperfection of the information obtainable. This remark particularly applies to the Widowers.

TABLE I.—*Showing the changes in the Number and Status of the Members of the Fund during the years* 1850-1872, *both inclusive.*

| Year. 1 Jan. | UNMARRIED MEMBERS. Existing at beginning of year. | Entered. | Married. | Left. | Died. | Net Increase. | MARRIED MEMBERS. FIRST MARRIAGE. Existing at beginning of year. | Entered. | Widowed first time. | Left. | Died. | Net Increase. | WIDOWED MEMBERS. FIRST WIFE DEAD. Existing at beginning of year. | Entered. | Left. | Died. | Married second time. | Net Increase. | Year. 1 Jan. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (1) | (2) | (3) | (4) | (5) | (6) | (1) | (2) | (3) | (4) | (5) | (6) | |
| 1850 | 225 | 25 | 18 | 2 | 4 | + 1 | 240 | 18 | 1 | ... | 2 | + 15 | 14 | 1 | 1 | ... | ... | 0 | 1850 |
| 1851 | 226 | 19 | 14 | ... | 5 | 0 | 255 | 14 | 5 | ... | 3 | + 6 | 14 | 5 | ... | ... | ... | + 5 | 1851 |
| 1852 | 226 | 26 | 18 | 6 | 1 | + 1 | 261 | 18 | 2 | ... | 2 | + 14 | 19 | 2 | 1 | ... | 1 | 0 | 1852 |
| 1853 | 227 | 20 | 18 | 3 | 1 | − 2 | 275 | 18 | 1 | 1 | 2 | + 14 | 19 | 1 | ... | 3 | ... | − 2 | 1853 |
| 1854 | 225 | 21 | 24 | 4 | 1 | − 8 | 289 | 24 | 1 | ... | 6 | + 17 | 17 | 1 | ... | ... | 2 | − 1 | 1854 |
| 1855 | 217 | 20 | 16 | 6 | 2 | − 4 | 306 | 17 | 7 | 1 | 1 | + 8 | 16 | 7 | ... | ... | ... | + 7 | 1855 |
| 1856 | 213 | 55 | 17 | 4 | 2 | +32 | 314 | 21 | 4 | 2 | 5 | + 10 | 23 | 4 | ... | 1 | 1 | + 2 | 1856 |
| 1857 | 245 | 25 | 19 | 2 | 18 | −14 | 324 | 21 | 6 | 2 | 21 | − 8 | 25 | 6 | ... | 6 | 4 | − 4 | 1857 |
| 1858 | 231 | 33 | 11 | 2 | 2 | +18 | 316 | 11 | 4 | 1 | 4 | + 2 | 21 | 4 | ... | 1 | 2 | + 1 | 1858 |
| 1859 | 249 | 19 | 29 | 7 | 2 | −19 | 318 | 29 | 7 | ... | 6 | + 16 | 22 | 7 | 1 | 1 | 3 | + 2 | 1859 |
| 1860 | 230 | 14 | 17 | 4 | 3 | −10 | 334 | 19 | 5 | ... | 5 | + 9 | 24 | 5 | ... | 1 | 1 | + 3 | 1860 |
| 1861 | 220 | 53 | 20 | 4 | 3 | +26 | 343 | 25 | 7 | ... | 3 | + 15 | 27 | 7 | 1 | ... | 3 | + 3 | 1861 |
| 1862 | 246 | 32 | 24 | 2 | 2 | + 4 | 358 | 28 | 12 | 3 | 8 | + 5 | 30 | 12 | ... | 1 | 3 | + 8 | 1862 |
| 1863 | 250 | 46 | 29 | 5 | 1 | +11 | 363 | 37 | 6 | 3 | 6 | + 22 | 38 | 6 | ... | ... | 5 | + 1 | 1863 |
| 1864 | 261 | 30 | 14 | 4 | 1 | +11 | 385 | 17 | 6 | ... | 5 | + 6 | 39 | 6 | ... | 3 | 4 | − 1 | 1864 |
| 1865 | 272 | 22 | 18 | ... | 3 | + 1 | 391 | 18 | 5 | 1 | 4 | + 8 | 38 | 5 | 1 | 1 | 8 | − 5 | 1865 |
| 1866 | 273 | ... | 13 | 2 | 2 | −17 | 399 | 14 | 5 | 1 | 8 | + 0 | 33 | 5 | ... | ... | 2 | + 3 | 1866 |
| 1867 | 256 | 22 | 15 | 4 | 2 | + 1 | 399 | 16 | 5 | 1 | 6 | + 4 | 36 | 5 | ... | ... | 4 | + 1 | 1867 |
| 1868 | 257 | 22 | 24 | 1 | 6 | − 9 | 403 | 26 | 6 | ... | 4 | + 16 | 37 | 6 | ... | ... | 6 | 0 | 1868 |
| 1869 | 248 | 20 | 14 | ... | 3 | + 3 | 419 | 15 | 3 | 1 | 7 | + 4 | 37 | 3 | ... | 2 | 5 | − 4 | 1869 |
| 1870 | 251 | 24 | 16 | ... | 4 | + 4 | 423 | 20 | 9 | ... | 6 | + 5 | 33 | 9 | ... | 1 | 4 | + 4 | 1870 |
| 1871 | 255 | 35 | 24 | 1 | ... | +10 | 428 | 29 | 3 | ... | 6 | + 20 | 37 | 3 | ... | 2 | 1 | 0 | 1871 |
| 1872 | 265 | 29 | 20 | 1 | 2 | + 6 | 448 | 20 | 6 | ... | 4 | + 10 | 37 | 6 | ... | 3 | 4 | − 1 | 1872 |
| 1873 | 271 | ... | ... | ... | ... | ... | 458 | ... | ... | ... | ... | ... | 36 | ... | ... | ... | ... | ... | 1873 |
| TOTAL ... | 612 | 432 | 64 | 70 | +46 | Total | 475 | 116 | 17 | 124 | +218 | Total | 116 | 5 | 26 | 63 | +22 | | |

| Year. 1 Jan. | MARRIED MEMBERS. SECOND MARRIAGE. Existing at beginning of year. | Entered. | Widowed second time. | Left. | Died. | Net increase. | WIDOW'D MEMBERS. SECOND WIFE DEAD. Existing at beginning of year. | Entered. | Married third time. | Net increase. | MARRIED MEMBERS. 3rd Marriage. Existing at beginning of year. | Entered. | WIVES. FIRST, SECOND, AND THIRD MARRIAGES. Existing at beginning of year. | Entered. | Left. | Died. | Widowed, came on fund. | Total of (3) (4) & (5). | Net increase. | Year. 1 Jan. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (1) | (2) | (3) | (4) | (1) | (2) | (1) | (2) | (3) | (4) | (5) | (6) | (7) | |
| 1850 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 240 | 18 | ... | 1 | 2 | 3 | + 15 | 1850 |
| 1851 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 255 | 14 | ... | 5 | 3 | 8 | + 6 | 1851 |
| 1852 | ... | 1 | ... | ... | ... | + 1 | ... | ... | ... | ... | ... | ... | 261 | 19 | ... | 2 | 2 | 4 | + 15 | 1852 |
| 1853 | 1 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 276 | 18 | 1 | 1 | 2 | 4 | + 14 | 1853 |
| 1854 | 1 | 2 | ... | ... | ... | + 2 | ... | ... | ... | ... | ... | ... | 290 | 26 | ... | 1 | 6 | 7 | + 19 | 1854 |
| 1855 | 3 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 309 | 17 | 1 | 7 | 1 | 9 | + 8 | 1855 |
| 1856 | 3 | 1 | ... | ... | ... | + 1 | ... | ... | ... | ... | ... | ... | 317 | 22 | 2 | 4 | 5 | 11 | + 11 | 1856 |
| 1857 | 4 | 4 | ... | ... | ... | + 4 | ... | ... | ... | ... | ... | ... | 328 | 25 | 2 | 6 | 21 | 29 | − 4 | 1857 |
| 1858 | 8 | 2 | ... | ... | ... | + 2 | ... | ... | ... | ... | ... | ... | 324 | 13 | 1 | 4 | 4 | 9 | + 4 | 1858 |
| 1859 | 10 | 3 | 1 | ... | ... | + 2 | ... | 1 | ... | +1 | ... | ... | 328 | 32 | ... | 8 | 6 | 14 | + 18 | 1859 |
| 1860 | 12 | 1 | 1 | ... | ... | + 0 | 1 | 1 | ... | +1 | ... | ... | 346 | 20 | ... | 6 | 5 | 11 | + 9 | 1860 |
| 1861 | 12 | 3 | ... | ... | 1 | + 2 | 2 | ... | 1 | −1 | ... | 1 | 355 | 29 | ... | 7 | 4 | 11 | + 18 | 1861 |
| 1862 | 14 | 3 | ... | ... | 2 | + 1 | 1 | ... | .. | ... | 1 | ... | 373 | 31 | 3 | 12 | 10 | 25 | + 6 | 1862 |
| 1863 | 15 | 5 | ... | ... | 1 | + 4 | 1 | ... | ... | ... | 1 | ... | 379 | 42 | 3 | 6 | 7 | 16 | + 26 | 1863 |
| 1864 | 19 | 4 | ... | ... | ... | + 4 | 1 | ... | ... | ... | 1 | ... | 405 | 21 | ... | 6 | 5 | 11 | + 10 | 1864 |
| 1865 | 23 | 8 | ... | 1 | ... | + 7 | 1 | ... | ... | ... | 1 | ... | 415 | 26 | 2 | 5 | 4 | 11 | + 15 | 1865 |
| 1866 | 30 | 2 | 1 | ... | ... | + 1 | 1 | 1 | ... | +1 | 1 | ... | 430 | 16 | 1 | 6 | 8 | 15 | + 1 | 1866 |
| 1867 | 31 | 4 | 1 | ... | ... | + 3 | 2 | 1 | ... | +1 | 1 | ... | 431 | 20 | 1 | 6 | 6 | 13 | + 7 | 1867 |
| 1868 | 34 | 6 | ... | ... | ... | + 6 | 3 | ... | 1 | −1 | 1 | 1 | 438 | 33 | ... | 6 | 4 | 10 | + 23 | 1868 |
| 1869 | 40 | 5 | ... | ... | ... | + 5 | 2 | ... | ... | ... | 2 | ... | 461 | 20 | 1 | 3 | 7 | 11 | + 9 | 1869 |
| 1870 | 45 | 4 | ... | ... | 1 | + 3 | 2 | ... | ... | ... | 2 | ... | 470 | 24 | ... | 9 | 7 | 16 | + 8 | 1870 |
| 1871 | 48 | 1 | 1 | ... | ... | + 0 | 2 | 1 | ... | +1 | 2 | ... | 478 | 30 | ... | 4 | 6 | 10 | + 20 | 1871 |
| 1872 | 48 | 4 | ... | ... | 1 | + 3 | 3 | .. | ... | ... | 2 | ... | 498 | 24 | ... | 6 | 5 | 11 | + 13 | 1872 |
| 1873 | 51 | ... | ... | ... | ... | ... | 3 | .. | ... | ... | 2 | ... | 511 | ... | ... | ... | ... | ... | ... | 1873 |
| TOTAL ... | 63 | 5 | 1 | 6 | +51 | Total | 5 | 2 | +3 | Total. | 2 | Total | 540 | 18 | 121 | 130 | 269 | +271 | | |

TABLE II.—*Showing the number and the Relative Proportions of Members Unmarried, Married, and Widowers respectively, at the beginning of each year, from* 1850 *to* 1873 *inclusive.*

| Year 1 Jan | Unmarried | Married | | | | Widowers. | | | Total Unmarried, Married, and Widowers | Percentage. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1st Marriage. | 2nd Marriage | 3rd Marriage | Total Married | 1st Time | 2nd Time. | Total Widowers | | Unmarried | Married | Widowers. |
| 1850 | 225 | 240 | ... | ... | 240 | 14 | ... | 14 | 479 | 47·0 | 50·1 | 2·9 |
| 1851 | 226 | 255 | ... | ... | 255 | 14 | .. | 14 | 495 | 45·7 | 51·5 | 2·8 |
| 1852 | 226 | 261 | ... | ... | 261 | 19 | ... | 19 | 506 | 44·7 | 51·6 | 3·7 |
| 1853 | 227 | 275 | 1 | ... | 276 | 19 | ... | 19 | 522 | 43·5 | 53·0 | 3·5 |
| 1854 | 225 | 289 | 1 | ... | 290 | 17 | ... | 17 | 532 | 42·3 | 54·5 | 3·2 |
| 1855 | 217 | 306 | 3 | ... | 309 | 16 | ... | 16 | 542 | 40·1 | 56·9 | 3·0 |
| 1856 | 213 | 314 | 3 | ... | 317 | 23 | | 23 | 553 | 38·6 | 57·3 | 4·1 |
| 1857 | 245 | 324 | 4 | ... | 328 | 25 | ... | 25 | 598 | 40·9 | 54·8 | 4·3 |
| 1858 | 231 | 316 | 8 | ... | 324 | 21 | ... | 21 | 576 | 40·1 | 56 3 | 3·6 |
| 1859 | 249 | 318 | 10 | ... | 328 | 22 | ... | 22 | 599 | 41·7 | 54·7 | 3·6 |
| 1860 | 230 | 334 | 12 | ... | 346 | 24 | 1 | 25 | 601 | 38·3 | 57·5 | 4·2 |
| 1861 | 220 | 343 | 12 | ... | 355 | 27 | 2 | 29 | 604 | 36·4 | 58·8 | 4 8 |
| 1862 | 246 | 358 | 14 | 1 | 373 | 30 | 1 | 31 | 650 | 37·8 | 57·4 | 4·8 |
| 1863 | 250 | 363 | 15 | 1 | 379 | 38 | 1 | 39 | 668 | 37·4 | 56·8 | 5·8 |
| 1864 | 261 | 385 | 19 | 1 | 405 | 39 | 1 | 40 | 706 | 37·0 | 57·4 | 5·6 |
| 1865 | 272 | 391 | 23 | 1 | 415 | 38 | 1 | 39 | 726 | 37·4 | 57·2 | 5·4 |
| 1866 | 273 | 399 | 30 | 1 | 430 | 33 | 1 | 34 | 737 | 37·0 | 58·4 | 4·6 |
| 1867 | 256 | 399 | 31 | 1 | 431 | 36 | 2 | 38 | 725 | 35·3 | 59·5 | 5·2 |
| 1868 | 257 | 403 | 34 | 1 | 438 | 37 | 3 | 40 | 735 | 35·0 | 59·6 | 5·4 |
| 1869 | 248 | 419 | 40 | 2 | 461 | 37 | 2 | 39 | 748 | 33·2 | 61·6 | 5·2 |
| 1870 | 251 | 423 | 45 | 2 | 470 | 33 | 2 | 35 | 756 | 33·3 | 62·1 | 4·6 |
| 1871 | 255 | 428 | 48 | 2 | 478 | 37 | 2 | 39 | 772 | 33·1 | 61·8 | 5·1 |
| 1872 | 265 | 448 | 48 | 2 | 498 | 37 | 3 | 40 | 803 | 33·1 | 61·9 | 5·0 |
| 1873 | 271 | 458 | 51 | 2 | 511 | 36 | 3 | 39 | 821 | 32·9 | 62·3 | 4·8 |

It will be seen from Table II. that the Members of the Fund have largely increased in numbers. Thus, in 1850, the total number of Active Members was 479. This number at the beginning of 1873 was raised to 821 (626 active); but, although a little under half of them, or 47 per cent., were bachelors at the first date, less than one-third were bachelors at the latter date. As above hinted, there is some doubt as to the correctness of the figures relating to the Widowers; but, if there be any error, it can only be small, and Table II. shows that the percentage of Widowers existing at any time, although slightly on the increase, has not materially altered of late years.

A careful examination of these Tables appears to indicate that the Fund has, during the course of the years under observation, been considerably altered in its character, and that any valuations made at intermediate dates, on the assumption that the Fund had practically arrived at a stationary position, would probably have been to some considerable extent incorrect. This would appear still more clearly had the children been brought into this Table.

# CHAPTER III.

## (*a*).—Mortality Experience of the Members and their Wives.

The most important matters, from an actuarial point of view, as regards the financial position of the Fund, are the rates of mortality and marriage among the Members and Incumbent Pensioners, because it is these that affect the financial liabilities which the Fund is intended to meet. Accordingly, a most thorough investigation has been made into the rates of mortality experienced by the Members during the 23 years of observation—from 1850 to 1872 inclusive. The results of such investigation appear in the following Tables, III. A, III. B, and III. C, and it will be seen that the investigation has been extended not only to the Members, but to their wives; and, in order to make it as complete as possible, the rates of mortality have been deduced in two ways.—*Firstly*, including all deaths, *Secondly*, after excluding deaths owing to the Mutiny.

Table III. (A).—*Mortality Experience of Bengal Civil Fund between 1st January* 1850, *and 31st December* 1872.

| Ages (inclusive). | Unmarried Members (Active and Retired). | | | | | Married Members (Active and Retired). | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Exposed to risk. | Deaths. | | Rate of Mortality per cent. | | Exposed to risk. | Deaths. | | Rate of Mortality per cent. | |
| | | Including Mutiny. | Excluding Mutiny. | Including Mutiny. | Excluding Mutiny. | | Including Mutiny. | Excluding Mutiny. | Including Mutiny. | Excluding Mutiny. |
| 18½–22½ | 1015·25 | 12 | 9 | 1·18 | ·89 | 107·5 | 1 | 1 | ·93 | ·93 |
| 23½–27½ | 2162·25 | 34 | 24 | 1·57 | 1·11 | 895· | 10 | 8 | 1·12 | ·90 |
| 28½–32½ | 1082·0 | 12 | 11 | 1·13 | 1·04 | 1493· | 15 | 10 | 1·00 | ·67 |
| 33½–37½ | 381·0 | 2 | 2 | ·52 | ·52 | 1446·5 | 22 | 19 | 1·52 | 1·31 |
| 38½–42½ | 304·5 | 2 | 2 | ·66 | ·66 | 1248· | 14 | 13 | 1·12 | 1·04 |
| 43½–47½ | 242·0 | 3 | 3 | 1·24 | 1·24 | 1148· | 15 | 11 | 1·35 | ·96 |
| 48½–52½ | 139·0 | 1 | 1 | ·72 | ·72 | 852· | 17 | 17 | 1·99 | 1·99 |
| 53½–57½ | 85·5 | 2 | 1 | 2·34 | 1·17 | 675· | 11 | 11 | 1·63 | 1·63 |
| 58½–62½ | 53·5 | 2 | 2 | 3·74 | 3·74 | 462· | 10 | 9 | 2·16 | 1·94 |
| 63½–67½ | 8·0 | ... | ... | ... | ... | 183·5 | 7 | 7 | 3·81 | 3·81 |
| 68½–72½ | ... | ... | ... | ... | ... | 70· | 6 | 6 | 8·58 | 8·58 |
| 73½–77½ | ... | ... | ... | ... | ... | 24· | ... | ... | ... | ... |
| 78½ upwards | ... | ... | ... | ... | ... | 3· | 2 | 2 | 66·67 | 66·67 |
| Total ... | 5473·0 | 70 | 55 | 1·28 | 1·01 | 8607·5 | 130 | 114 | 1·51 | 1·32 |

TABLE III. (A)—*continued.*

| Ages (inclusive) | WIDOWERS (Active and Retired). | | | UNMARRIED MEMBERS, MARRIED MEMBERS, and WIDOWERS (Active and Retired). | | | | |
|---|---|---|---|---|---|---|---|---|
| | Exposed to risk. | Deaths. | | Exposed to risk. | Deaths. | | Rate of Mortality per cent. | |
| | | Including Mutiny. | Excluding Mutiny. | | Including Mutiny. | Excluding Mutiny. | Including Mutiny. | Excluding Mutiny. |
| 18½–22½ | 2·5 | ... | ... | 1125·25 | 13 | 10 | 1·16 | ·89 | |
| 23½–27½ | 37· | 1 | ... | 3094·25 | 45 | 32 | 1·45 | 1·04 | |
| 28½–32½ | 65·5 | 2 | 2 | 2640·5 | 29 | 23 | 1·10 | ·87 | |
| 33½–37½ | 76· | 2 | ... | 1903·5 | 26 | 21 | 1·37 | 1·10 | |
| 38½–42½ | 96·5 | 3 | 1 | 1649· | 19 | 16 | 1·15 | ·97 | |
| 43½–47½ | 93·5 | 1 | 1 | 1483·5 | 19 | 15 | 1·28 | 1·01 | |
| 48½–52½ | 96· | 3 | 3 | 1087· | 21 | 21 | 1·93 | 1·93 | |
| 53½–57½ | 83·5 | 5 | 5 | 844· | 18 | 17 | 2·13 | 2·01 | |
| 58½–62½ | 71· | 5 | 5 | 586·5 | 17 | 16 | 2·90 | 2·73 | |
| 63½–67½ | 46· | ... | ... | 237·5 | 7 | 7 | 2·95 | 2·95 } 4·69 | |
| 68½–72½ | 12· | 2 | 2 | 82· | 8 | 8 | 9·76 | 9·76 } | |
| 73½–77½ | 8· | 1 | 1 | 32· | 1 | 1 | 3·12 | 3·12 } 10·5 | |
| 78½–80½ | 3· | 1 | 1 | 6· | 3 | 3 | 50·00 | 50·00 } | |
| TOTAL ... | 690·5 | 26 | 21 | 14,771 | 226 | 190 | 1·53 | 1·29 | |

TABLE III (B).—*Different grouping of Ages—Unmarried Members, Married Members, and Widowers (Active and Retired).*

| Ages. | Exposed to risk. | Deaths (excluding Mutiny.) | Rate of Mortality per cent. | |
|---|---|---|---|---|
| 18½–20½ | 270· | 2 | ·74 } | ·93 |
| 21½–25½ | 2749· | 26 | ·94 } | |
| 26½–30½ | 2879·5 | 30 | 1·04 | |
| 31½–35½ | 2180·5 | 19 | ·87 } | ·88 |
| 36½–40½ | 1667· | 15 | ·90 } | |
| 41½–45½ | 1606· | 21 | 1·31 | |
| 46½–50½ | 1243·5 | 21 | 1·69 | |
| 51½–55½ | 914·5 | 11 | 1·31 } | 2·03 |
| 56½–60½ | 712· | 22 | 3·09 } | 2·79 |
| 61½–65½ | 364· | 8 | 2·20 } | |
| 66½–70½ | 127· | 10 | 7·87 } | 6·51 |
| 71½–75½ | 42· | 1 | 2·38 } | |
| 76½–80½ | 16· | 4 | 25·00 | |
| TOTAL ... | 14,771·0 | 190 | | |

TABLE III. (C).—*Mortality Experience of Wives of Members (Active and Retired) (Annuitants not included).*

| Ages. | Exposed to Risk. | Deaths. | Rates of Mortality, per cent. | |
|---|---|---|---|---|
| Up to 22½ inclusive | 1012·0 | 18 | 1·78 | |
| 23½–27½ „ | 1765·5 | ·26 | 1·48 | |
| 28½–32½ „ | 1745·0 | 23 | 1·32 | |
| 33½–37½ „ | 1334·5 | 17 | 1·28 | |
| 38½–42½ „ | 980·5 | 13 | 1·33 | |
| 43½–47½ „ | 737·0 | 7 | ·95 | |
| 48½–52½ „ | 521·5 | 7 | 1·34 | |
| 53½–57½ „ | 279·5 | 6 | 2·15 | |
| 58½–62½ „ | 148·5 | 2 | 1·35 | |
| 63½–67½ „ | 63·5 | 1 | 2·53 | |
| 68½–72½ „ | 15·5 | 1 | } | |
| | 8603·0 | 121 | 1·41 | |

In Table IV. is given a comparison of the results of the experience with Mr. Brown's Table 17(A), stated to have been deduced from the experience of the Bengal Civil Service—1801 to 1858 inclusive, active and retired male life.

TABLE IV.—*Comparison of Actual Deaths, as per* TABLE III (B), *with Deaths to be expected by use of Mr. Brown's Table* 17A.

| Ages. | Actual Deaths. | Expected Deaths. | | | | | |
|---|---|---|---|---|---|---|---|
| 18½–20½ | 2 | 4·6 | being 230 per cent. of actual deaths, or 130 per cent. in excess. | | | | |
| 21½–25½ | 26 | 47·8 | „ | 184 | „ | 84 | „ |
| 26½–30½ | 30 | 50·7 | „ | 169 | „ | 69 | „ |
| 31½–35½ | 19 | 40·5 | „ | 213 | „ | 113 | „ |
| 36½–40½ | 15 | 33·9 | „ | 226 | „ | 126 | „ |
| 41½–45½ | 21 | 33·6 | „ | 160 | „ | 60 | „ |
| 46½–50½ | 21 | 25·9 | „ | 123 | „ | 23 | „ |
| 51½–55½ | 11 | 21·7 | „ | 115 | „ | 15 | „ |
| 56½–60½ | 22 | 16·3 | | | | | |
| 61½–65½ | 8 | 14·2 | „ | 114 | „ | 14 | „ |
| 66½–70½ | 10 | 6·4 | | | | | |
| 71½–75½ | 1 | 3· | „ | 120 | „ | 20 | „ |
| 76½–80½ | 4 | 3· | | | | | |
| | 190 | 301·6 | 158 per-cent. of actual deaths, or 58 per-cent. in excess. | | | | |

If the 36 deaths taken as attributable to the Mutiny are included in actual deaths the excess is 33 per-cent.

An examination of Table IV. shows conclusively that the mortality experience of the Fund, as regards its Members, has, during the period of observation, been considerably lighter than that given by Mr. Brown's Table 17 (A), and this is particularly noticeable at the younger ages.

As the Rate of Mortality assumed to prevail among the Members affects in such an important degree any actuarial estimates with regard to the financial position of the Fund, it was considered desirable to make a second independent investigation into this question, treating the Members as all of the same age at entry, and ascertaining the Rates of Mortality prevailing among them, according to the length of time they have been in the Service. In this way the following Tables, viz. :—V (A), V (B), V (C), and V (D) were obtained.

TABLE V. (A).—*Mortality Experience of Members who have not been Married (Active and Retired).*

| Years completed from Entry. | Exposed to risk. | Deaths. | | Rate of Mortality per cent. | |
|---|---|---|---|---|---|
| | | Including Mutiny. | Excluding Mutiny. | Including Mutiny. | Excluding Mutiny. |
| 0– 4 | 2640·75 | 31 | 22 | 1·17 | ·83 |
| 5– 9 | 1516·75 | 25 | 20 | 1·65 | 1·32 |
| 10–14 | 583·50 | 2 | 2 | ·34 | ·34 |
| 15–19 | 268·75 | 2 | 2 | ·74 | ·74 |
| 20–24 | 299·75 | 3 | 3 | 1·00 | 1·00 |
| 25–29 | 204·00 | 3 | 3 | 1·47 | 1·47 |
| 30–34 | 116·50 | ... | ... | ... | ... |
| 35–39 | 78·00 | 4 | 3 | 5·12 | 3·84 |
| 40–44 | 41·00 | ... | ... | ... | ... |
| 45–49 | 5·00 | ... | ... | ... | ... |
| TOTAL ... | 5754·00 | 70 | 55 | 1·22 | ·96 |

TABLE V. (B).—*Mortality Experience of Married Life (First Marriages of Members) (Active and Retired).*

| Years completed from entry. | Married members exposed to risk. | Members Died. | | Wives died. | Rate per cent. of Members' Mortality. | | Rate per cent. of Wives' Mortality. |
|---|---|---|---|---|---|---|---|
| | | Including Mutiny. | Excluding Mutiny. | | Including Mutiny. | Excluding Mutiny. | |
| 0– 4 | 505·50 | 5 | 4 | 8 | ·99 | ·79 | 1·58 |
| 5– 9 | 1250·50 | 13 | 10 | 20 | 1·04 | ·80 | 1·60 |
| 10–14 | 1386·75 | 17 | 12 | 18 | 1·23 | ·87 | 1·30 |
| 15–19 | 1132·75 | 16 | 15 | 16 | 1·41 | 1·32 | 1·41 |
| 20–24 | 1095·25 | 14 | 11 | 13 | 1·28 | 1·00 | 1·19 |
| 25–29 | 956·75 | 19 | 17 | 11 | 1·99 | 1·78 | 1·15 |
| 30–34 | 724·75 | 10 | 10 | 10 | 1·38 | 1·38 | 1·38 |
| 35–39 | 593·75 | 9 | 8 | 9 | 1·52 | 1·35 | 1·52 |
| 40–44 | 367·00 | 10 | 10 | 6 | 2·73 | 2·73 | 1·64 |
| 45–49 | 120·50 | 6 | 6 | 3 | 4·98 | 4·98 | 2·49 |
| 50–54 | 50·75 | 3 | 3 | ... | 5·91 | 5·91 | ... |
| 55–59 | 19·25 | 1 | 1 | 2 | 5·20 | 5·20 | 10·39 |
| 60–61 | 2·00 | 1 | 1 | ... | ... | ... | ... |
| TOTAL ... | 8205·5 | 124 | 108 | 116 | 1·51 | 1·32 | 1·41 |

TABLE V. (C).—*Mortality Experience of Married Life (Second and Third Marriages of Members) (Active and Retired.)*

| Years completed from entry. | Second Marriages. | | | Third Marriages. | |
|---|---|---|---|---|---|
| | Married Members exposed to risk. | Members died. | Wives died. | Married Members exposed to risk. | |
| 0– 4 | ·5 | ... | ... | ... | No Husbands or Wives died. |
| 5– 9 | 31·5 | 1 | 1 | 1·5 | |
| 10–14 | 44·0 | 2 | 1 | 5·0 | |
| 15–19 | 50·5 | ... | 1 | 5·0 | |
| 20–24 | 97·5 | 1 | 1 | ... | |
| 25–29 | 73·5 | ... | 1 | 4·5 | |
| 30–34 | 35·0 | ... | ... | ... | |
| 35–39 | 34·0 | ... | ... | ... | |
| 40–44 | 35·5 | 1 | ... | ... | |
| 45–49 | 18·0 | 1 | ... | ... | |
| 50–54 | 7·0 | ... | ... | ... | |
| 55–58 | 3·5 | ... | ... | ... | |
| TOTAL ... | 430·5 | 6 | 5 | 16 | |

TABLE V. (D).—*Experience of Members who are Widowers, both as to Mortality and Re-marriage.*

| Years completed from Entry. | Widowers—First Wife Dead. | | | | Widowers—Second Wife Dead. | | |
|---|---|---|---|---|---|---|---|
| | Exposed to risk of Death or Re-marriage. | Died. | | Married 2nd time. | Exposed to risk of Death or Re-marriage. | Died. | Married 3rd time. |
| | | Including Mutiny. | Excluding Mutiny. | | | | |
| 0– 4 | 12·0 | ... | ... | 1 | ... | ... | ... |
| 5– 9 | 65·0 | 3 | 2 | 12 | 1·5 | No deaths. | 1 |
| 10–14 | 62·0 | 1 | ... | 7 | 2·5 | ... | ... |
| 15–19 | 90·0 | 1 | ... | 9 | 6·5 | ... | ... |
| 20–24 | 87·0 | 3 | 1 | 19 | 10·0 | ... | ... |
| 25–29 | 82·0 | 1 | 1 | ... | 3·0 | ... | 1 |
| 30–34 | 87·0 | 5 | 5 | 4 | 1·5 | ... | ... |
| 35–39 | 87·5 | 3 | 3 | 5 | ... | ... | ... |
| 40–44 | 69·5 | 5 | 5 | 3 | ... | ... | ... |
| 45–49 | 40·5 | 1 | 1 | 3 | ... | ... | ... |
| 50–54 | 9·0 | 1 | 1 | ... | ... | ... | ... |
| 55–59 | 10·0 | 1 | 1 | ... | ... | ... | ... |
| 60–61 | 2·0 | 1 | 1 | ... | ... | ... | ... |
| TOTAL ... | 703·5 | 26 | 21 | 63 | 25·0 | No deaths. | 2 |

TABLE V. (E).—*Mortality Experience of Married Members and Widowers (Active and Retired).*

| Years completed from entry. | Exposed to risk (Married). | Died. | | Wives. | | Exposed to risk (Married and Widowers). | Died (Married and Widowers). | | Rate of Mortality per cent. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Including Mutiny. | Excluding Mutiny. | Died. | Rate of Mortality per cent. | | Including Mutiny. | Excluding Mutiny. | Including Mutiny. | Excluding Mutiny. |
| 0– 4 | 506·00 | 5 | 4 | 8 | 1·58 | 518·00 | 5 | 4 | ·97 | ·77 |
| 5– 9 | 1283·50 | 14 | 11 | 21 | 1·64 | 1350·00 | 17 | 13 | 1·26 | ·97 |
| 10–14 | 1435·75 | 19 | 14 | 19 | 1·32 | 1500·25 | 20 | 14 | 1·33 | ·93 |
| 15–19 | 1188·25 | 16 | 15 | 17 | 1·43 | 1284·75 | 17 | 15 | 1·32 | 1·17 |
| 20–24 | 1192·75 | 15 | 12 | 14 | 1·17 | 1289·75 | 18 | 13 | 1·40 | 1·01 |
| 25–29 | 1034·75 | 19 | 17 | 12 | 1·16 | 1119·75 | 20 | 18 | 1·79 | 1·61 |
| 30–34 | 759·75 | 10 | 10 | 10 | 1·32 | 848·25 | 15 | 15 | 1·77 | 1·77 |
| 35–39 | 627·75 | 9 | 8 | 9 | 1·43 | 715·25 | 12 | 11 | 1·68 | 1·54 |
| 40–44 | 402·50 | 11 | 11 | 6 | 1·49 | 472·00 | 16 | 16 | 3·39 | 3·39 |
| 45–49 | 138·50 | 7 | 7 | 3 | 2·17 | 179·00 | 8 | 8 | 4·50 | 4·50 |
| 50–54 | 57·75 | 3 | 3 | ... | | 66·75 | 4 | 4 | 6·00 | 6·00 |
| 55–59 | 22·75 | 1 | 1 | 2 | 2·41 | 32·75 | 2 | 2 | 6·10 | 6·10 |
| 60–61 | 2·00 | 1 | 1 | ... | | 4·00 | 2 | 2 | ... | ... |
| TOTAL ... | 8652·00 | 130 | 114 | 121 | 1·40 | 9380·50 | 156 | 135 | 1·67 | 1·44 |

The results thus brought out, as a matter of course, fully confirm the mortality experience, as given in Table III., and as the ages of the Members on entry into the Service have not, on the average, materially differed, it has been considered, on the whole, expedient to adhere throughout the following investigations to this method of arrangement.*

An endeavour was made, by the aid of information obtained from the India Office, to trace those who had presumably left the Service and the Fund on account of ill-health, the object being to ascertain what has been the Rate of Mortality among those compelled to leave India as invalids; but, as the materials available were extremely incomplete, no trustworthy deductions could be made therefrom. At the same time, it cannot be too well understood that the Rates of Mortality found to prevail among Members of the Fund could not safely be considered at present as indicating the Rates of Mortality likely to prevail among ordinary residents in India. The Members of the Fund undergo, in the first instance, a strict medical examination, with a special reference to the suitability of their physical constitution to Indian life, and, in addition, there is reason to believe that for some years after arrival in India a process of weeding out takes place which would have the effect of reducing the Rates of Mortality among the Members. To what exact extent this process of weeding out has hitherto reduced the Rate of Mortality has not, as above stated, at present been ascertained; but, in making use of the past mortality experience as a guide for the future, it must be distinctly understood that the assumption is made that the future conditions and circumstances of Membership of the Fund will not materially differ from those of the past 23 years.

* It will be observed that there is a slight difference in the total exposed to risk, when compared with the corresponding Tables III. This is not in any way material, and arises from the assumptions required to be made being not quite the same.

Although, as stated above, the mortality experience of the years 1850 to 1872 has been far lighter than that assumed to prevail by Mr. Brown, yet, bearing in mind the importance of not under-estimating the mortality among the Members, it did not appear to be wise to adopt a new Table of Mortality agreeing as closely as possible with the results indicated in Table V.

The Mortality Table for Members, which has been used throughout the present calculations, is given in Table I. of the Appendix, and has been deduced from the experience of the Fund, as given in Table V.; the slight adjustments that have been made all having the effect of somewhat over-stating the rates of mortality at the younger ages, as compared with the actual experience.

It will be seen on examination that the Rates of Mortality given in Table I. of the Appendix differ very considerably from those of Mr. Brown's Table 17 (A), at the younger ages, but this difference gradually diminishes as the age increases, so that the Rate of Mortality for the year following 29 years from entry into the Service, has been made to agree with Mr. Brown's Rate of Mortality for age 50, and, after that point, the two have been made to agree to the end of the Table.

### (*b*).—Marriage Experience of Members.

The following Table shows the experience of the Fund during the years 1850-1872, as regards the rate of marriage among the bachelor Members.

Table VI.—*Showing the Rate of Marriage among the Bachelors, being Members of the Fund (Active and Retired), 1850-1872, both inclusive.*

| Years completed from Entry. | Rate per cent. of Marriages. |
|---|---|
| 0 | 2·79 or 9·20 (including those who entered as married) |
| 1 | 6·27 |
| 2 | 7·13 |
| 3 | 8·01 |
| 4 | 9·38 |
| 5 | 7·76 |
| 6 | 9·41 |
| 7 | 9·16 |
| 8 | 9·30 |
| 9 | 11·59 |
| 10 | 10·07 |
| 11 | 18·91 |
| 12 | 12·24 |
| 13 | 11·73 |
| 14 | 7·77 |
| 15 | 6·02 |
| 16 | 3·59 |
| 17 | 9·30 |
| 18 | 12·70 |
| 19 | 2·20 |
| 20 | 12·07 |
| 21–25 | 2·7 |
| 26–30 | 5·0 |
| 31–35 | 3·6 |
| 36–42 | 2·2 |

| Years completed from entry. | Rate per cent. of Marriages. |
|---|---|
| 5–9 | 9·2 |
| 10–14 | 12·0 |
| 15–19 | 6·7 |
| 20–24 | 4·7 |
| 25–29 | 4·9 |
| 30–34 | 2·6 |
| 35 & upwards | 2·9 |

An examination of this Table certainly appears to indicate, up to a certain duration of membership, a steady rate of increase in the rate of marriage, reaching a maximum after 11 to 12 years completed from entry into the Service. There is, further, an indication that the time at which marriage takes place is, to some degree, influenced by furlough privileges; but, without ample information on this point, no conclusions can be positively arrived at.

It will be seen on a comparison of this Table with Table No. 25(B) of Mr. Brown's First Report, that the results, on the whole, closely agree with those stated to have been deduced by him from the experience of the 13 years, 1850-1862.

Without doubt, the rate of marriage immediately after entry and for a year or two afterwards must be greatly influenced by the limits of age fixed for entrance into the Service, and as considerable changes may be from time to time made in this respect, the experience of the past may not prove applicable as a guide to the future. Indeed, not only must the rate of marriage at the earlier ages depend upon the age at entry into the Service, but, as previously pointed out, there seems to be reason to believe that the regulations as to furlough privileges must have more or less influence, and as these, like the limits of age, are liable to considerable alterations, it appears to be a matter of difficulty to come to any definite conclusion as to the probable rate of marriage hereafter among the bachelors. Another matter which might certainly tend to materially alter the rate of marriage would be such an alteration in the average salaries as should substantially increase the salaries of the younger members.

In Table V. of the Appendix will be seen the rate of marriage as deduced from the experience which has been used in combination with the rate of mortality given in Table I. of the Appendix, to ascertain out of a given number entering the Service as bachelors, how many will attain each completed year of service, still remaining bachelors. The values of reversionary annuities to their future wives, also given in the Table, are calculated by means of these data.

According to the rules of the Fund, members losing their first wives have the right of re-marriage, and this to an unlimited extent, although a scale of fines is in force for disparity of ages of the husband and wife where the husband is more than 10 years older than his wife. Some idea of the extent to which this right is exercised is furnished in Table I. of Chapter II. From this Table it appears that 116 members out of 715 married members had during the years of observation lost their wives, and of these 63, or more than one-half, had already re-married. Of these 63 married a second time; 5 had lost their second wives; and of these 5 widowed a second time, 2 had already married a third time. It is clear, therefore, that the right of re-marriage must have an important financial effect upon the Fund, and it appeared to be extremely desirable that in the valuation of the Fund, particularly bearing in mind the fact that it has been proposed to appropriate any surplus that may be brought out by such valuation, ample reserve should be made to meet the liability arising from the right of widowed members to re-marry.

Let now $x$ be the present age of the husband, and $y$ that of his wife, then the value of the reversionary annuity to *that wife only*, is approximately the sum of the series,

$$vq_x p_y P_{y+\frac{1}{2}} + v^2({}_2q_x)({}_2p_y)P_{y+1+\frac{1}{2}} + \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (1)$$

where $v^n$ = present value of 1 due $n$ years hence,
${}_nq_x$ = probability of $x$, the husband, dying in $n$th year,
${}_np_y$ = probability of $y$, the wife, living $n$ years.
$P_y$ = present value of annuity to wife aged $y$.

If we make the assumption that whenever the husband, now aged $x$, dies, his wife, now aged $y$, will be alive, the formula (1) becomes—

$$vq_x P_{y+\frac{1}{2}} + v^2{}_2q_x P_{y+1+\frac{1}{2}} + v^3{}_3q_x P_{y+2+\frac{1}{2}} + \quad . \quad . \quad . \quad . \quad (2)$$

This formula (2), it will be seen, really gives the value of an assurance of varying amount payable at the end of the year in which the husband dies. In other words, the use of this formula is tantamount to making the assumption that whenever the wife dies the husband immediately marries another wife of the same present age.

It is evident, however, that towards the end of life there is a very small probability of the husband re-marrying after the death of his then wife. For practical purposes, it may safely be assumed that, after say 40 years from entry into the Service, no re-marriages of Members who have lost their wives will take place, so that the formula (2) for a married member just entered the Service would have to be modified as follows :—

$$vq_x P_{y+\frac{1}{2}} + v^2{}_2q_x P_{y+1+\frac{1}{2}} + v^3{}_3q_x P_{y+2+\frac{1}{2}} + \ . \ . \ . + v^{39}{}_{39}q_x P_{y+38+\frac{1}{2}} + v^{40}{}_{40}q_x P_{y+39+\frac{1}{2}}$$
$$+ v^{41} \cdot {}_{41}q_x \cdot p_{y+40} \cdot P_{y+40+\frac{1}{2}} + v^{42}({}_{42}q_x)({}_2p_{y+40})P_{y+41+\frac{1}{2}} + \quad . \quad . \quad . \quad . \quad . \quad (3)$$

This formula (3) therefore represents the value of the following benefit :—

An absolute assurance of $P_{y+n-\frac{1}{2}}$, payable in the event of $x$ dying in the $n$th year, so long as $n$ does not exceed 40. When $n$ exceeds 40, the amount of the assurance is still $P_{y+n-\frac{1}{2}}$, but is only to be payable in the event of the wife, who is assumed to have been alive at the commencement of the 41st year, being alive at his death.

For the purpose of constructing tables which should give the values of the various benefits described above, it has been assumed that all married Members who have not completed 11 years from entry have wives of 24 years of age, and that Members who have completed 11 or more years of membership have wives living whose ages are, one with another, 14 years in excess of the duration of the husband's membership. Thus, a married Member who has completed say 20 years' membership is assumed to have a wife 34 years of age; if 25 years' membership, 39 years of age, and so on. In connection with this question it should be stated that an investigation into the difference between the ages of husband and wife showed the following results :—

TABLE VII.—*Showing the Average Excess of Husband's Age over Wife's Age, as deduced from the Experience of the Fund.*

| Years completed from Entry at time of Marriage. | No. of Marriages. | FIRST MARRIAGES. Average excess in years of Husband's Age over Wife's Age. |
|---|---|---|
| 0 | 88 | ·6 |
| 1 | 58 | 1·7 |
| 2 | 60 | 2·3 |
| 3 | 53 | 3·0 |
| 4 | 61 | 4·4 |
| 5 | 41 | 5·0 |
| 6 | 51 | 6·5 |
| 7 | 40 | 6·3 |
| 8 | 32 | 6·7 |
| 9 | 38 | 7·5 |
| 10 | 23 | 7·3 |
| 11 | 34 | 9·5 |
| 12 | 22 | 10·0 |
| 13 | 18 | 10·0 |
| 14 | 13 | 13·1 |
| 15–19 | 39 | 12·7 |
| 20–24 | 22 | 16·4 |
| 25–29 | 13 | 19·2 |
| 30 & upwards. | 7 | 33·6 |

General average excess for 1st marriages, 6·2 years.
Do. 2nd „ 12·4 „
Do. 3rd „ 13·0 „

It is considered that the excess of husband's age over the wife's is fairly represented by the assumptions above indicated, but there does not appear to be any objection to the existing practice of imposing a fine where the excess is above 10 years. There may, however, in the face of the pension being reducible on re-marriage of the widow be no reason to reduce the limit from 10 years as it at present stands in the rates of the Fund.

The two Tables VI. (A) and VI. (B) of the Appendix, are constructed on these principles, the values of P used being the same as those used by Mr. Brown. In the first of them, no allowance is made for the probability of re-marriage of Members who lose their wives. The second table is calculated on the assumption (1) that if a married member dies before completing 40 years' membership he will be certain to leave a widow; (2) that on completing 40 years' membership he will have a wife living; and (3) that if he dies after completing 40 years' membership, nothing will be payable unless his wife, who was alive at the end of 40 years from entry, is alive at the time of his death.

A comparison of the difference in the reserves required under Table VI. (B) and VI. (A) with the additional reserves hitherto employed in the Fund valuations, to meet the liability on account of re-marriages of married members, shows no great disparity between the results, as will be seen from the following Table:—

| Years from entry. | Difference between Table VI.(B) and VI.(A) in years' purchase. | | Ages. | Additional reserve by Mr. Brown's Table. | |
|---|---|---|---|---|---|
| | At 8 per cent. | At 5 per cent. | | At 8 per cent. | At 5 per cent. |
| 0 | ·173 | ·466 | 20–30 | ·219 | ·519 |
| 5 | ·185 | ·476 | 30–40 | ·248 | ·529 |
| 10 | ·206 | ·498 | 40–50 | ·161 | ·323 |
| 15 | ·232 | ·526 | 50–60 | ·117 | ·204 |
| 20 | ·246 | ·516 | 60 and upwards. | nil. | nil. |
| 25 | ·246 | ·473 | | | |
| 30 | ·221 | ·392 | | | |
| 35 | ·148 | ·242 | | | |
| 40 | nil. | nil. | | | |

It is, however, to be borne in mind, in making this comparison, that Mr. Brown's additional reserve included that for the liability brought upon the Fund by the children born of such re-marriages.

As already indicated, the rate of re-marriage among widows of Members cannot be considered as at all satisfactorily ascertained, and, indeed, it is doubtful in some degree, whether such re-marriages should in any way be anticipated in a valuation. At all events, the facts as far as procurable show a lower rate of re-marriage than that assumed in the tables hitherto employed, and it has therefore been considered desirable to calculate the values of the contingent benefit to wives in both ways—first, allowing for re-marriage of widows; secondly, not allowing for the re-marriage of widows.

It should be here stated, that the values of P not allowing for re-marrriage have been taken as for $P_y$ and not for $P_{y+1}$, so that the wife's age is assumed to be half a year younger than in the corresponding values allowing for re-marriage. This will explain the fact that, at the higher ages, when no re-marriages of widows are supposed to take place according to the tables used by Mr. Brown, the values in the columns headed "not allowing for reduction of pension by re-marriage," are somewhat above those in the columns headed "allowing for reduction of pension by re-marriage." Had the ages been taken exactly the same, the values would of course, where no re-marriages of widows take place, that is, where the rate of re-marriage is *nil*, be identical.

It will further be observed that the values headed "allowing for reduction of pension by re-marriage," coincide or nearly so in the case of the first table with those calculated by Mr. Brown, as they should do, after 29 years of service, because from that time the rate of mortality among the Members agrees with that used by Mr. Brown. The small differences that exist are caused partly by the employment of four-figure logarithms, but mainly in consequence of the fact that Mr. Brown's values of $d_x$ are only given in whole numbers, and consequently the values of log $d_x$ deduced therefrom do not agree with the values of log $d_x$ directly deduced from cols. (1) and (5) of his Table (17A), the latter being the correct values.

In order to compare fully the financial effects produced by the employment of the two tables, it is necessary not only to have the values of the benefits, but also the values of the married Members' additional subscriptions calculated on the same assumptions. These have been inserted in the outer column, being calculated in the manner and with the use of the data explained further on, in Chapter VI., On Average Salaries and the Subscriptions payable.

# CHAPTER IV.

## (*a*).—Mortality Experience of the Sons of Members.

The first of the two following Tables shows the experience of the Fund as regards the Rates of Mortality among the Sons of Members, and the second Table is the Mortality Table deduced therefrom, and applied in the calculation of the values of benefits to fatherless sons of Members. Table II. of the Appendix gives the calculated values of benefits to fatherless sons, according to the Rules of the Fund.

Table I.—*Showing the Rate of Mortality among the Sons (whether Annuitants or not) of Members of the Fund* 1850-1872, *both inclusive.*

| Ages. | Exposed to risk. | Died. | Rate of Mortality per cent. |
|---|---|---|---|
| 0 | 1088·5 | 88 | 8·08 |
| 1 | 987·5 | 50 | 5·06 |
| 2 | 928·0 | 15 | 1·62 |
| 3 | 902·5 | 11 | 1·22 |
| 4 | 871·5 | 7 | ·81 |
| 5- 9 | 4043·5 | 19 | ·47 |
| 10-14 | 3471·0 | 12 | ·34 |
| 15-20 | 2848·0 | 12 | ·42 |
| | 15140·5 | 214 | ... |

Table II.—*Showing the Rate of Mortality among Sons (whether Annuitants or not) of Members, deduced from the experience of the Fund* 1850-1872, *and from which the value of Sons' benefits has been calculated.*

| Age *x*. | Probability of dying in year from age *x*. |
|---|---|
| 0 | ·0808 |
| 1 | ·0506 |
| 2 | ·0162 |
| 3 | ·0122 |
| 4 | ·0081 |
| 5 | ·0065 |
| 6 | ·0055 |
| 7 | ·0040 |
| 8 | ·0030 |
| 9 | ·0030 |
| 10 | ·0031 |
| 11 | ·0032 |
| 12 | ·0033 |
| 13 | ·0034 |
| 14 | ·0036 |
| 15 | ·0038 |
| 16 | ·0040 |
| 17 | ·0042 |
| 18 | ·0044 |
| 19 | ·0048 |
| 20 | ·0050 |

(*b*).—Mortality and Marriage Experience of the Daughters of Members.

The Rates of Mortality and Marriage found to prevail among the Daughters of Members, are shown in the accompanying Table, and the results obtained are compared with the expected deaths and marriages by Mr. Griffith Davies' Tables, previously used in the valuations of the Fund.

Table III.—*Showing the Rates of Mortality and Marriage among Daughters (whether Annuitants or not) of Members of the Bengal Civil Fund*, 1850–1872, *both inclusive.*

| Age | Exposed to Risk | Died | Married. | Rate per cent. of | | Griffith Davies' Table | |
|---|---|---|---|---|---|---|---|
| | | | | Mortality | Marriage | Expected Deaths | Expected Marriages |
| 0 | 1009·5 | 75 | ... | 7·43 | | 64·20 | ... |
| 1 | 910 | 46 | | 5·05 | | 35·19 | .. |
| 2 | 844·5 | 13 | | 1·54 | .. | 24·49 | .. |
| 3– 5 | 2372 | 13 | | ·55 | . | 36 58 | ... |
| 6– 8 | 2177 | 11 | | ·51 | . | 17·09 | |
| 9–11 | 1958·5 | 6 | | ·31 | .. | 12·86 | |
| 12–14 | 1730 5 | 3 | . | ·17 | . | 11·37 | 5·45 |
| 15–17 | 1532·5 | 13 | 11 | ·85 | ·72 | 10·70 | 45 09 |
| 18–20 | 1165 | 1 | 73 | ·34 | 6 27 | 9·49 | 87·12 |
| 21–23 | 753 | 1 | 60 | ·13 | 7·97 | 6·67 | 58·40 |
| 24–29 | 700 | 5 | 49 | ·71 | 7·00 | 6 72 | 39·34 |
| 30–39 | 242·5 | ... | 12 | | 1·95 | 2·64 | 7·26 |
| 40–49 | 61 | | 2 | | 3·28 | ·78 | ·75 |
| 50–56 | 15·5 | | | | | ·26 | ·15 |
| . | 15471·5 | 190 | 207 | .. | . | 239 34 | 243·56 |

It will be seen that both the Mortality and Marriage Rates have been, on the whole, considerably lighter than those to be expected by Mr. Griffith Davies' Tables; and as it appeared desirable in the interests of the Fund to construct Tables to be used in the valuation which should more closely accord with the experience, the following Table has been constructed as better representing the Rates of Mortality and Marriage likely to prevail in the future, and Tables III. and IV. of the Appendix give the value of benefits, as deduced therefrom. It cannot, however, be too carefully borne in mind that the marriage rates are deduced from the experience among daughters, *whether fatherless or not.* This is important, because it is not certain that the rate of marriage among fatherless daughters in receipt of annuities would correspond with that among daughters whose fathers are living.

TABLE IV.—*Showing the Rates of Mortality and Marriage among Daughters (whether Annuitants or not) of Members, deduced from the experience of the Fund 1850-1872, both inclusive, and from which the Values of Daughters' Benefits have been calculated.*

| Age $x$. | Probability of Dying in year from age $x$. | Probability of Marrying in year from age $x$. | Age $x$. | Probability of Dying in year from age $x$. | Probability of Marrying in year from age $x$. |
|---|---|---|---|---|---|
| 0 | ·0743 | . | 26 | Same as | ·060 |
| 1 | ·0505 | ... | 27 | used by | ·054 |
| 2 | ·0154 | ... | 28 | Mr. Brown. | ·047 |
| 3 | ·0100 | ... | 29 | ... | ·042 |
| 4 | ·0070 | ... | 30 | ... | ·038 |
| 5 | ·0055 | ... | 31 | ... | ·035 |
| 6 | ·0050 | ... | 32 | ... | ·032 |
| 7 | ·0045 | ... | 33 | ... | ·030 |
| 8 | ·0035 | ... | 34 | ... | ·028 |
| 9 | ·0030 | ... | 35 | ... | ·026 |
| 10 | ·0030 | ... | 36 | ... | ·024 |
| 11 | ·0030 | ... | 37 | ... | ·022 |
| 12 | ·0030 | ... | 38 | ... | ·020 |
| 13 | ·0035 | ... | 39 | ... | ·018 |
| 14 | ·0045 | ... | 40 | ... | ·016 |
| 15 | ·0055 | .. | 41 | ... | ·014 |
| 16 | ·0060 | ·010 | 42 | | ·011 |
| 17 | ·0070 | ·020 | 43 | ... | ·010 |
| 18 | ·0070 | ·050 | 44 | ... | ·010 |
| 19 | ·0075 | ·070 | 45 | ... | ·009 |
| 20 | ·0080 | ·085 | 46 | .... | ·006 |
| 21 | ·0088 | ·080 | 47 | ... | ·005 |
| 22 | &c., | ·075 | 48 | ... | ·004 |
| 23 | same as used | ·072 | 49 | ... | ·002 |
| 24 | by Mr. Brown. | ·068 | 50 | ... | ·000 |
| 25 | ... | ·064 | | | |

(*c*).—MORTALITY AND MARRIAGE EXPERIENCE OF WIDOWS OF MEMBERS.

IN the following Table is given the Experience as to rates of mortality and re-marriage among the widows of Members coming on to the Fund in the years 1850-1872, it being noted that a widow when re-married has not been included in the exposed to risk.

TABLE V.—*Showing the Rates of Mortality and Marriage among the Widows coming on to the Fund, 1850-1872, both inclusive.*

| Age. | Exposed to Risk | Died. | Married | Rate per-cent. of | | Griffith Davies' Table. | |
|---|---|---|---|---|---|---|---|
| | | | | Mortality | Marriage. | Expected Deaths. | Expected Marriages. |
| 18½–25½ | 79·0 | 1 | 4 | 1·3 | 5·1 | ·72 | 5·41 |
| 26½–30½ | 138·0 | 1 | 6 | ·7 | 4·3 | 1·37 | 6·37 |
| 31½–35½ | 164·0 | . | 6 | . | 3·7 | 1·79 | 4·86 |
| 36½–40½ | 200·5 | 3 | 2 | 1·5 | 1· | 2·35 | 3·97 |
| 41½–50½ | 298·5 | 7 | 1 | 2·3 | ·3 | 3·98 | 3·44 |
| 51½–60½ | 149·0 | 4 | | 2·7 | | 2·79 | 1·12 |
| 61½–70½ | 64·0 | 1 | | 1·6 | | 2·20 | ... |
| 71½–77½ | 11·0 | 1 | | 9·1 | | ·73 | |
| ... | 1104·0 | 18 | 19 | . | | 15·93 | 25·17 |

From this Table, it would appear that the rate of mortality prevailing among the widows has, on the whole, been somewhat in excess of that to be expected according to Griffith Davies' Tables, and the rate of re-marriage somewhat less than that to be expected by the same Table, the difference in the latter case being at the older ages. The numbers are, however, altogether too small to enable Tables to be constructed from the experience. Under these circumstances, it has been considered that the rates of mortality and re-marriage used by Mr. Brown in previous Reports, need not be departed from in calculating the values of contingent benefits to Members' widows. In the calculation of the value of Incumbent widows' Pensions under the new rules, the rate of mortality used is the same as heretofore, but the rate of re-marriage of widows used is that deduced from the experience of the Fund as regards daughters of Members. The tabular values are given in Table VIII. (Appendix).

## CHAPTER V.

### As to Retirements.

A matter bearing directly upon the important question of rates of subscription is that of retirements upon pensions. Formerly Retired Members used to pay, it appears, the same percentages on their pensions as paid by Members in active service on salaries; but the percentages now paid on pensions are only one-half those paid on salaries.

The information as to retirements was not found, for various reasons, to be in a perfectly satisfactory form to deal with, and the results, therefore, shown in the following Table, can only be given as the best obtainable under the circumstances.*

For the purposes of the Fund, what is mainly required is the proportion which the Retired Members, of a given number of years' standing in the Service, bear to the entire number of Members in the Fund of the same standing. Accordingly, these particulars have been taken out, and are given in column 3 of the Table.

In column 4 is given the Rate of Retirement which has been assumed as that most likely to represent the future experience of the Fund, and in column 5 is given the corresponding proportion which the number of Retired Members of a given standing in the Service will bear to the total number of Members of the Fund of the same standing.

---

* The particulars relating to Members who retired on Invalid Pensions before completing 25 years appear to have been mislaid or lost, as they are not to be found among the papers stated to have been furnished.

TABLE *showing the Experience of the Fund,* 1850—1872 *inclusive, as regards Retirements, and the Rates of Retirement assumed in the Valuation Tables.*

| Years completed from Entry. | EXPERIENCE OF THE FUND, 1850—1872. Rate of Retirement per cent. | EXPERIENCE OF THE FUND, 1850—1872. Proportion per cent. of Members retired to Total Number of same standing. | Years completed from Entry. | ASSUMED IN VALUATION TABLES. Rate of Retirement per cent. of those in Active Service. | ASSUMED IN VALUATION TABLES. Proportion per cent. of Members retired to Total Number of same standing. |
|---|---|---|---|---|---|
| 13 | ·25 | ·37 | ... | ... | ... |
| 14 | ·8 | ·93 | ... | ... | ... |
| 15 | ·3 | 1·57 | ... | ... | ... |
| 16 | 1·0 | 2·02 | ... | ... | ... |
| 17 | ·3 | 2·08 | ... | ... | ... |
| 18 | ·3 | 2·15 | ... | ... | ... |
| 19 | 1·1 | 2·93 | ... | ... | ... |
| 20 | 1·0 | 3·01 | ... | ... | ... |
| 21 | 1·6 | 3·22 | ... | ... | ... |
| 22 | 1·0 | 3·79 | ... | ... | ... |
| 23 | 1·0 | 4·52 | ... | ... | ... |
| 24 | 3·4 | 5·35 | ... | ... | ... |
| 25 | 15·1 | 11·29 | 25 | 15 | 15 |
| 26 | 13·1 | 22·09 | 26 | 16 | 29 |
| 27 | 14·9 | 31·73 | 27 | 17 | 41 |
| 28 | 14·0 | 39·20 | 28 | 18 | 51 |
| 29 | 20·9 | 46·33 | 29 | 19 | 61 |
| 30 | 16·0 | 53·94 | 30 | 20 | 68 |
| 31 | 20·2 | 61·13 | 31 | 20 | 75 |
| 32 | 15·5 | 66·50 | 32 | 20 | 80 |
| 33 | 16·9 | 69·55 | 33 | 20 | 84 |
| 34 | 21·0 | 76·11 | 34 | 20 | 87 |
| 35 | 33·3 | 80·73 | 35 | 23 | 90 |
| 36 | 23·7 | 85·06 | 36 | 30 | 93 |
| 37 | 32·7 | 89·89 | 37 | 40 | 96 |
| 38 | 29·1 | 92·71 | 38 | 50 | 98 |
| 39 | 25·8 | 93·16 | 39 | 50 | 99 |
| 40–45 | 33·0 | 96·00 | 40 & upwards | 100 | 100 |

According to the regulations now in force in the Service, retirement, after 35 years' service, is more or less compulsory; and it has, therefore, been considered advisable to assume that Active Service will have ceased in all cases at the expiration of 40 years' service. It is believed that the figures in column 5 may be taken as fairly representing, with a tendency to the safe side, the probable experience of the Fund as regards retirements.

No attempt has been made to deal with the question of Retirements on Invalid Pensions before completing 25 years' service.

In connection with this question, it is desirable to state that, although there is no doubt a tendency on the part of retired bachelors to cease paying to the Fund, it has not been thought necessary to take any cognisance of this in the Tables. If allowance is to be made for this in any valuation of future subscriptions, it will also be necessary, in order to be consistent, to do the same in the valuation of future liabilities. This would introduce complications into the Tables which it is desirable to avoid, and would have little or no effect upon the results.

# CHAPTER VI.

## Average Salaries of Members, and the Subscriptions payable.

The fact that the subscriptions of the Members in Active Service are based entirely upon their salaries and furlough allowances, rendered essential a careful investigation into the average salaries received by Members of the same standing in the Service, with a view of obtaining answers to the following questions:—

1. What the average salaries, according to years of Service, have been over a number of years?
2. Whether there appears to be any clear indication that the average salary, based on years of Service, is, on the whole, increasing or decreasing?
3. Whether there is any marked difference in the average salary received by Members of the three Provinces—Bengal, North-West Provinces, and the Punjaub?
4. What effect is produced on the subscriptions to the Fund, in consequence of Members on furlough only paying on their furlough allowances?

Through the courtesy of Major-General Hannyngton, of the India Office, copies of the Civil Lists of the various Provinces for a number of years were furnished, from which the following particulars have been tabulated. A more intimate knowledge of various matters of detail would, no doubt, have been of great value in dealing with the figures given in the Civil Lists; but it is believed that the particulars that have been taken out, and which are given in the two following Tables, will—although in some respects perhaps imperfect— prove of considerable assistance towards furnishing answers to the questions above stated.

It should here be stated that the years completed from entry—0, 1, 2, 3—have been in these Tables applied in the following manner:—Take, as an example, the year 1873. The Members who arrived in India in 1873, and before July, are stated as having completed 0 years of Service. Those who arrived in India in 1872 are stated to have completed 1 year of Service. Those who arrived in 1871, 2 years of Service; and so on. This method, although not strictly correct, will not, it is believed, materially affect the results.

Table A is given in an abbreviated form on account of the difficulty of printing it *in extenso*.

Table B will be seen to be a summary of Table A, in quinquennial groups of years of Service, the figures for each Province being kept separate. Assuming

the figures as taken from the Civil Lists to fairly represent the average salaries on which the payments of Members' subscriptions are based, it will be seen that a tolerably regular progression in the rate of average salary obtains up to about 29 to 32 years' Service. After this time, the average rate of salary is liable to considerable fluctuations on account of the small number of Members, and the fact that a few receive very high salaries. As stated in the heading of the Tables, travelling allowances and a few miscellaneous allowances have not been included. It will also be observed that the information obtainable as to the Punjaub Province is incomplete.

TABLE A.—*Showing the average monthly Salaries (not generally including travelling allowances, and a few miscellaneous allowances) in rupees received by Members of the Fund, as deduced from the Civil Lists generally for July in each of the years* 1870-1878 *inclusive, of the three provinces, Bengal, North-Western Provinces, and Punjaub.*

| Years completed from Entry. | 1870. — Total Average Pay, Bengal only. | 1871. — Total Average Pay, Bengal only. | 1872. — Total Average Pay. | 1873. — Total Average Pay. | 1874. — Total Average Pay, Punjaub not included. | 1875. — Total Average Pay, Punjaub not included. | 1876. — Total Average Pay, Punjaub not included. | 1877. — Total Average Pay, Punjaub not included. | 1878. — Total Average Pay, Punjaub not included. | 1870-78. No. | 1870-78. Total Average Pay. | Years completed from Entry. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 400 | ... | 450 | 400 | ... | ... | ... | 400 | 400 | 8 | 406 | 0 |
| 1 | 405 | 414 | 429 | 437 | 422 | 412 | 400 | 411 | 400 | 164 | 418 | 1 |
| 2 | 446 | 455 | 526 | 506 | 480 | 471 | 444 | 460 | 500 | 158 | 481 | 2 |
| 3 | 547 | 556 | 489 | 494 | 482 | 520 | 540 | 615 | 626 | 151 | 537 | 3 |
| 4 | 700 | 652 | 548 | 539 | 559 | 544 | 613 | 627 | 680 | 139 | 592 | 4 |
| 5 | 700 | 700 | 646 | 571 | 546 | 695 | 583 | 689 | 736 | 129 | 612 | 5 |
| 6 | 745 | 780 | 767 | 713 | 650 | 648 | 676 | 722 | 752 | 122 | 705 | 6 |
| 7 | 717 | 756 | 648 | 767 | 798 | 654 | 674 | 807 | 697 | 132 | 715 | 7 |
| 8 | 1,025 | 784 | 721 | 702 | 767 | 842 | 663 | 722 | 850 | 146 | 780 | 8 |
| 9 | 911 | 935 | 736 | 742 | 805 | 500 | 814 | 826 | 747 | 171 | 806 | 9 |
| 10 | 1,098 | 852 | 942 | 823 | 823 | 651 | 500 | 818 | 816 | 172 | 844 | 10 |
| 11 | 1,227 | 1,200 | 806 | 987 | 954 | 824 | 849 | 767 | 994 | 166 | 921 | 11 |
| 12 | 1,193 | 1,121 | 995 | 943 | 1,111 | 1,119 | 845 | 952 | 1,200 | 165 | 1,031 | 12 |
| 13 | 1,660 | 1,426 | 1,159 | 1,256 | 1,125 | 1,270 | 1,069 | 1,140 | 1,054 | 175 | 1,204 | 13 |
| 14 | 1,860 | 1,807 | 1,495 | 1,630 | 1,513 | 1,276 | 1,288 | 1,163 | 1,394 | 185 | 1,422 | 14 |
| 15 | 2,016 | 1,903 | 1,529 | 1,589 | 1,709 | 1,498 | 1,264 | 1,480 | 1,363 | 188 | 1,502 | 15 |
| 16 | 2,458 | 1,992 | 1,709 | 1,867 | 1,822 | 1,819 | 1,531 | 1,550 | 1,661 | 166 | 1,710 | 16 |
| 17 | 2,417 | 2,458 | 1,908 | 1,870 | 1,780 | 2,039 | 1,564 | 1,693 | 1,823 | 152 | 1,889 | 17 |
| 18 | 2,564 | 2,425 | 2,102 | 2,212 | 1,920 | 2,114 | 1,983 | 1,915 | 1,616 | 120 | 2,025 | 18 |
| 19 | 1,694 | 2,587 | 2,446 | 1,836 | 2,367 | 1,942 | 2,065 | 2,287 | 2,278 | 118 | 2,144 | 19 |
| 20 | 2,697 | 1,583 | 2,121 | 2,315 | 2,021 | 2,236 | 2,042 | 2,152 | 2,195 | 118 | 2,183 | 20 |
| 21 | 2,705 | 2,816 | 2,472 | 1,711 | 2,384 | 2,500 | 2,278 | 2,122 | 2,197 | 103 | 2,287 | 21 |
| 22 | 2,833 | 2,705 | 2,644 | 2,250 | 2,166 | 2,359 | 2,464 | 2,709 | 2,520 | 88 | 2,516 | 22 |
| 23 | 2,666 | 2,666 | 2,673 | 2,516 | 2,361 | 2,139 | 2,401 | 2,541 | 2,658 | 73 | 2,506 | 23 |
| 24 | 2,416 | 2,666 | 2,583 | 2,943 | 2,700 | 1,736 | 2,393 | 2,548 | 2,964 | 70 | 2,580 | 24 |
| 25 | 2,773 | 2,454 | 2,583 | 2,333 | 2,430 | 3,137 | 2,527 | 3,708 | 2,650 | 75 | 2,765 | 25 |
| 26 | 3,208 | 2,840 | 2,528 | 2,389 | 2,417 | 3,487 | 3,014 | 1,917 | 3,233 | 71 | 2,776 | 26 |
| 27 | 2,555 | 3,283 | 2,650 | 2,179 | 3,148 | 3,139 | 3,392 | 3,078 | 2,340 | 61 | 2,880 | 27 |
| 28 | 3,222 | 3,208 | 3,091 | 3,104 | 1,778 | 3,000 | 3,139 | 3,650 | 3,837 | 51 | 3,151 | 28 |
| 29 | 4,166 | 3,952 | 3,481 | 2,917 | 3,266 | 3,000 | 3,750 | 2,583 | 3,297 | 38 | 3,411 | 29 |
| 30 | 4,444 | ... | 3,676 | 3,555 | 2,187 | 3,611 | 3,000 | 2,833 | 3,458 | 28 | 3,372 | 30 |
| 31 | ... | 2,500 | 3,055 | 3,607 | 3,555 | 3,055 | 3,611 | 6,166 | 1,944 | 26 | 3,394 | 31 |
| 32 | ... | ... | 2,749 | 3,261 | 3,833 | 3,555 | 3,055 | 3,333 | 6,166 | 23 | 3,592 | 32 |
| 33 | 2,500 | ... | 2,500 | 3,375 | 3,261 | 3,833 | 3,555 | 3,322 | 2,500 | 21 | 3,341 | 33 |
| 34 | ... | 2,500 | ... | 2,500 | 3,375 | 3,166 | 4,100 | 3,555 | 3,417 | 17 | 3,500 | 34 |
| 35 | 4,166 | ... | 5,725 | ... | 2,500 | 3,375 | 3,166 | 1,944 | 4,166 | 12 | 3,433 | 35 |
| 36 | 4,166 | 4,166 | ... | 5,725 | ... | ... | 3,750 | ... | ... | 5 | 4,706 | 36 |
| 37 | ... | 4,166 | 4,166 | ... | 2,500 | ... | ... | 3,750 | ... | 4 | 3,645 | 37 |
| 38 | ... | ... | 4,166 | ... | ... | 2,500 | ... | ... | 3,750 | 3 | 3,472 | 38 |
| 39 | 4,166 | ... | ... | 4,166 | ... | ... | ... | ... | ... | 2 | 4,166 | 39 |
| 40 | ... | 4,166 | ... | ... | ... | ... | ... | ... | ... | 1 | 4,166 | 40 |
| 41 | ... | ... | 4,166 | ... | ... | ... | ... | ... | ... | 1 | 4,166 | 41 |
| 42 | ... | ... | ... | 4,166 | ... | ... | ... | ... | ... | 1 | 4,166 | 42 |
| 43 | ... | ... | ... | .. | 4,166 | ... | ... | ... | ... | 1 | 4,166 | 43 |
| 44 | ... | ... | ... | ... | .. | 4,166 | ... | ... | ... | 1 | 4,166 | 44 |
| 45 | ... | ... | ... | ... | ... | ... | 4,166 | ... | ... | 1 | 4,166 | 45 |
| 46 | ... | ... | ... | ... | ... | ... | ... | 4,166 | ... | 1 | 4,166 | 46 |

TABLE B.—*Showing the average monthly Salaries (not generally including travelling and a few miscellaneous allowances) in rupees received by Members of the Fund, as deduced from the Civil Lists generally for July in each of the years* 1870-1878 *inclusive, of the three provinces, Bengal, North-Western Provinces, and Punjaub, arranged in groups.*

| Years completed from Entry. | 1870. | | | | | | | | 1871. | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bengal. | | N. W. Provinces. | | Punjaub. | | Total. | | Bengal. | | N. W. Provinces. | | Punjaub. | | Total. | |
| | No. of Members. | Average Pay. | No. of Members. | Average Pay. | No. of Members. | Average Pay. | No. of Members. | Average Pay. | No. of Members. | Average Pay. | No. of Members. | Average Pay. | No. of Members. | Average Pay. | No. of Members. | Average Pay. |
| 0– 4 | 36 | 470 | | | | | 36 | 470 | 44 | 522 | | | | | 44 | 522 |
| 5– 9 | 77 | 847 | | | | | 77 | 847 | 52 | 823 | | | | | 52 | 823 |
| 10–14 | 58 | 1,484 | | | | | 58 | 1,484 | 64 | 1,212 | | | | | 64 | 1,212 |
| 15–19 | 23 | 2,260 | | | | | 23 | 2,260 | 39 | 2,129 | | | | | 39 | 2,129 |
| 20–24 | 27 | 2,672 | | | | | 27 | 2,672 | 25 | 2,567 | | | | | 25 | 2,567 |
| 25–29 | 27 | 2,933 | | | | | 27 | 2,933 | 29 | 3,167 | | | | | 29 | 3,167 |
| 30–34 | 4 | 3,958 | | | | | 4 | 3,958 | 3 | 2,500 | | | | | 3 | 2,500 |
| 35–39 | 3 | 4,166 | | | | | 3 | 4,166 | 2 | 4,166 | | | | | 2 | 4,166 |
| 40–44 | ... | ... | | | | | ... | ... | 1 | 4,166 | | | | | 1 | 4,166 |
| 45–46 | ... | ... | | | | | ... | ... | ... | | | | | | ... | ... |

| Years completed from Entry. | 1872. | | | | | | | | 1873. | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bengal. | | N. W. Provinces. | | Punjaub. | | Total. | | Bengal. | | N. W. Provinces. | | Punjaub. | | Total. | |
| | No. of Members. | Average Pay. | No. of Members. | Average Pay. | No. of Members. | Average Pay. | No. of Members. | Average Pay. | No. of Members. | Average Pay. | No. of Members. | Average Pay. | No. of Members. | Average Pay. | No. of Members. | Average Pay. |
| 0– 4 | 40 | 496 | 33 | 470 | 21 | 526 | 94 | 493 | 44 | 465 | 27 | 459 | 27 | 557 | 98 | 488 |
| 5– 9 | 47 | 705 | 33 | 646 | 23 | 776 | 103 | 702 | 40 | 711 | 31 | 600 | 15 | 764 | 86 | 680 |
| 10–14 | 70 | 1,119 | 44 | 835 | 11 | 1,140 | 125 | 1,021 | 73 | 1,052 | 53 | 948 | 17 | 972 | 143 | 1,004 |
| 15–19 | 46 | 2,007 | 38 | 1,719 | 7 | 1,522 | 91 | 1,847 | 52 | 1,922 | 39 | 1,765 | 10 | 1,705 | 101 | 1,840 |
| 20–24 | 24 | 2,790 | 21 | 2,270 | 2 | 2,291 | 47 | 2,498 | 29 | 2,739 | 20 | 1,795 | 2 | 2,166 | 51 | 2,346 |
| 25–29 | 19 | 2,953 | 16 | 2,480 | 3 | 2,361 | 38 | 2,711 | 18 | 2,782 | 16 | 2,328 | 3 | 2,361 | 37 | 2,551 |
| 30–34 | 7 | 4,154 | 9 | 2,555 | ... | ... | 16 | 3,254 | 8 | 4,135 | 8 | 2,733 | ... | ... | 16 | 3,434 |
| 35–39 | 3 | 3,816 | 1 | 8,333 | ... | ... | 4 | 4,945 | 2 | 3,672 | 1 | 8,333 | ... | ... | 3 | 5,235 |
| 40–44 | 1 | 4,166 | ... | ... | ... | ... | 1 | 4,166 | 1 | 4,166 | ... | ... | ... | ... | 1 | 4,166 |
| 45–46 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |

| Years completed from Entry. | 1874. | | | | | | | | 1875. | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bengal. | | N. W. Provinces. | | Punjaub. | | Total. | | Bengal. | | N. W. Provinces. | | Punjaub. | | Total. | |
| | No. of Members. | Average Pay. | No. of Members. | Average Pay. | No. of Members. | Average Pay. | No. of Members. | Average Pay. | No. of Members. | Average Pay. | No. of Members. | Average Pay. | No. of Members. | Average Pay. | No. of Members. | Average Pay. |
| 0– 4 | 44 | 480 | 27 | 480 | | | 71 | 480 | 45 | 493 | 29 | 469 | | | 74 | 483 |
| 5– 9 | 37 | 708 | 30 | 701 | | | 67 | 705 | 42 | 775 | 24 | 598 | | | 66 | 711 |
| 10–14 | 72 | 1,151 | 49 | 983 | | | 121 | 1,091 | 71 | 1,296 | 47 | 875 | | | 118 | 1,111 |
| 15–19 | 56 | 2,012 | 37 | 1,756 | | | 93 | 1,910 | 52 | 2,143 | 38 | 1,554 | | | 90 | 1,894 |
| 20–24 | 25 | 2,519 | 22 | 2,251 | | | 47 | 2,393 | 21 | 2,615 | 23 | 1,884 | | | 44 | 2,233 |
| 25–29 | 14 | 3,221 | 15 | 2,265 | | | 29 | 2,728 | 16 | 3,754 | 17 | 2,627 | | | 33 | 3,204 |
| 30–34 | 9 | 3,120 | 9 | 3,419 | | | 18 | 3,269 | 9 | 3,435 | 8 | 3,635 | | | 17 | 3,529 |
| 35–39 | 1 | 2,500 | 1 | 2,500 | | | 2 | 2,500 | 2 | 2,750 | 1 | 3,750 | | | 3 | 3,083 |
| 40–44 | 1 | 4,166 | ... | ... | | | 1 | 4,166 | 1 | 4,166 | ... | ... | | | 1 | 4,166 |
| 45–46 | ... | ... | ... | ... | | | ... | ... | ... | ... | ... | ... | | | ... | ... |

| Years completed from Entry. | 1876. Bengal. No. of Members. | 1876. Bengal. Average Pay. | 1876. N. W. Provinces. No. of Members. | 1876. N. W. Provinces. Average Pay. | 1876. Punjaub. No. of Members. | 1876. Punjaub. Average Pay. | 1876. Total. No. of Members. | 1876. Total. Average Pay. | 1877. Bengal. No. of Members. | 1877. Bengal. Average Pay. | 1877. N. W. Provinces. No. of Members. | 1877. N. W. Provinces. Average Pay. | 1877. Punjaub. No. of Members. | 1877. Punjaub. Average Pay. | 1877. Total. No. of Members. | 1877. Total. Average Pay. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0- 4 | 47 | 527 | 24 | 456 | | | 71 | 503 | 42 | 562 | 24 | 490 | | | 66 | 536 |
| 5- 9 | 46 | 761 | 36 | 587 | | | 82 | 685 | 47 | 915 | 38 | 706 | | | 85 | 754 |
| 10-14 | 50 | 1,234 | 34 | 807 | | | 84 | 1,104 | 45 | 1,169 | 36 | 871 | | | 81 | 1,037 |
| 15-19 | 55 | 1,877 | 35 | 1,161 | | | 90 | 1,599 | 62 | 1,882 | 40 | 1,477 | | | 102 | 1,724 |
| 20-24 | 36 | 2,480 | 35 | 1,962 | | | 71 | 2,224 | 40 | 2,503 | 31 | 2,102 | | | 71 | 2,327 |
| 25-29 | 18 | 3,543 | 19 | 2,774 | | | 36 | 3,148 | 17 | 3,886 | 16 | 2,249 | | | 33 | 3,093 |
| 30-34 | 8 | 3,552 | 8 | 3,593 | | | 16 | 3,573 | 5 | 3,710 | 8 | 3,698 | | | 13 | 3,702 |
| 35-39 | ... | ... | 3 | 3,361 | | | 3 | 3,361 | 1 | 2,500 | 3 | 2,361 | | | 4 | 2,395 |
| 40-44 | ... | ... | ... | ... | | | ... | ... | ... | ... | ... | ... | | | ... | ... |
| 45-46 | 1 | 4,166 | ... | ... | | | 1 | 4,166 | 1 | 4,166 | ... | ... | | | 1 | 4,166 |

| Years completed from Entry. | 1878. Bengal. No. of Members. | 1878. Bengal. Average Pay. | 1878. N. W. Provinces. No. of Members. | 1878. N. W. Provinces. Average Pay. | 1878. Punjaub. No. of Members. | 1878. Punjaub. Average Pay. | 1878. Total. No. of Members. | 1878. Total. Average Pay. | TOTAL. Bengal. No. of Members. | TOTAL. Bengal. Average Pay. | TOTAL. N. W. Provinces. No. of Members. | TOTAL. N. W. Provinces. Average Pay. | TOTAL. Punjaub. No. of Members. | TOTAL. Punjaub. Average Pay. | TOTAL. Total. No. of Members. | TOTAL. Total. Average Pay. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0- 4 | 41 | 550 | 25 | 536 | | | 66 | 545 | 383 | 508 | 189 | 479 | 48 | 543 | 620 | 502 |
| 5- 9 | 49 | 794 | 33 | 693 | | | 82 | 753 | 437 | 777 | 225 | 729 | 38 | 772 | 700 | 735 |
| 10-14 | 38 | 1,182 | 31 | 857 | | | 69 | 1,036 | 541 | 1,207 | 294 | 883 | 28 | 1,037 | 863 | 1,091 |
| 15-19 | 64 | 1,829 | 51 | 1,478 | | | 115 | 1,674 | 449 | 1,978 | 278 | 1,559 | 17 | 1,629 | 744 | 1,814 |
| 20-24 | 38 | 2,679 | 31 | 2,156 | | | 69 | 2,461 | 265 | 2,603 | 183 | 2,061 | 4 | 2,238 | 452 | 2,379 |
| 25-29 | 21 | 3,611 | 13 | 2,077 | | | 34 | 3,024 | 179 | 3,289 | 111 | 2,414 | 6 | 2,361 | 296 | 2,940 |
| 30-34 | 3 | 3,555 | 9 | 3,296 | | | 12 | 3,361 | 56 | 3,609 | 59 | 3,266 | ... | ... | 115 | 3,434 |
| 35-39 | 1 | 4,166 | 1 | 3,750 | | | 2 | 3,958 | 15 | 3,633 | 11 | 3,985 | ... | ... | 26 | 3,771 |
| 40-44 | ... | ... | ... | ... | | | ... | ... | 5 | 4,166 | ... | ... | ... | ... | 5 | 4,166 |
| 45-46 | ... | ... | ... | ... | | | ... | ... | 2 | 4,166 | ... | ... | ... | ... | 2 | 4,166 |

An examination of the results of the two Tables for the purpose of obtaining information on the question of whether the average rate of salary as ranging with length of membership has been, on the whole, undergoing, in the course of the nine years, any material alteration, will be best made by arranging the figures in the following form:—

*Average Monthly Salary in rupees according to years completed from entry.*

| Year. | 0-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25-29 | 30-34 | 35-39 | 40-44 | 45-46 | All Years of Service. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1870 | 470 | 847 | 1,484 | 2,260 | 2,672 | 2,933 | 3,958 | 4,166 | ... | ... | 1,568 |
| 1871 | 522 | 823 | 1,212 | 2,129 | 2,567 | 3,167 | 2,500 | 4,166 | 4,166 | ... | 1,554 |
| 1872 | 493 | 702 | 1,021 | 1,847 | 2,498 | 2,711 | 3,254 | 4,945 | 4,166 | ... | 1,370 |
| 1873 | 488 | 680 | 1,004 | 1,840 | 2,346 | 2,551 | 3,434 | 5,235 | 4,166 | ... | 1,360 |
| 1874 | 480 | 705 | 1,091 | 1,910 | 2,393 | 2,728 | 3,269 | 2,500 | 4,166 | ... | 1,450 |
| 1875 | 483 | 711 | 1,111 | 1,894 | 2,233 | 3,204 | 3,529 | 3,083 | 4,166 | ... | 1,483 |
| 1876 | 503 | 685 | 1,104 | 1,599 | 2,224 | 3,148 | 3,573 | 3,361 | ... | 4,166 | 1,482 |
| 1877 | 536 | 754 | 1,037 | 1,724 | 2,327 | 3,093 | 3,702 | 2,395 | ... | 4,166 | 1,510 |
| 1878 | 545 | 753 | 1,036 | 1,674 | 2,461 | 3,024 | 3,361 | 3,958 | ... | ... | 1,520 |
| 1870-8 | 502 | 735 | 1,091 | 1,814 | 2,379 | 2,940 | 3,434 | 3,771 | 4,166 | 4,166 | 1,468 |

It is necessary to bear in mind that, for the years 1870 and 1871, the figures only relate to the Bengal Province, and that the Punjaub Province only appears in the figures for the two years 1872 and 1873. If the North-West Provinces and the Punjaub had been included throughout, it is possible that the figures would have run more regularly.

As regards the first 5 years of Service, there appears to have been a tendency for the average salary to increase—viz., from 470 to 545, with an average of 502.

As regards the second 5 years, there would appear to have been a tendency for the average salary to diminish, and then again to increase, but not quite to the amount it stood at in 1870.

As regards the third 5 years, the rate of salary appears to have had a decided tendency to diminish; but this is probably more apparent than real, in consequence of the North-West and Punjaub Provinces not being brought into account in the years 1870 and 1871. From 1872 the rate of salary has been about the same.

As regards the fourth 5 years, allowing for the absence of the North-West and Punjaub Provinces for the first 2 years, the rate of salary appears to have had a downward tendency, but only for the years 1876, 1877, and 1878.

As regards the fifth 5 years, if we allow for the absence of the North-West and Punjaub Provinces, there does not appear to have been much fluctuation.

As regards the sixth 5 years, there would appear to have been a slight tendency to increase.

The remaining years of Service cannot be spoken about with any confidence, as, from the circumstances of the case, these must necessarily be liable to considerable fluctuations. Apart from this, the small percentage of Members then in Active Service renders the exact determination of the average rate of salary for such Members a matter of no great importance financially.

There does not, on the whole, appear to be any marked indication of a perceptible increase or decrease in the average rate of salary, although for years of Service 0-4 there appears to be a slight tendency to increase, and for years of Service 15-19 a tendency to decrease.

As regards the three Provinces, compared one with another, there appears to be a clear indication that the average salary in the North-West Provinces is certainly less than in Bengal, and than in the Punjaub too, as far as the figures extend.

This, however, is a question with which this reference cannot be expected to deal. As far as the Fund is concerned, no distinction is made between Members of one Province and Members of another. They are all Members of the same

Fund, and those who pay less than the average subscription in one Province are in no different position as regards the Fund from those who pay less than the average subscription in another Province. All that can be said about the question is from a financial point of view, and is to this effect: that, provided the number of Members in the North-West Provinces and the Punjaub do not in the future bear a materially different proportion as compared with those in Bengal, from those deduced in Tables A and B, and on the assumption, of course, that nothing takes place hereafter having the effect of materially altering these average salaries, the average salaries there brought out may be safely taken as the basis for the calculation of subscriptions.

The next important question to consider, in connection with the subscriptions, is the effect of furlough allowances. According to the instructions contained in the reference, every Member of the Service is entitled to four years' furlough out of 25 years' service, and, from the Rules of the Fund, it appears that Members when on furlough pay subscriptions calculated on their furlough allowances, and not on their pay as given in the Civil Lists. An elaborate investigation has accordingly been made with a view of ascertaining what percentage of Members, who pass through given years of membership, are on furlough during these years of membership, and consequently paying subscriptions, not on average salaries, but on furlough allowances calculated according to the rules laid down in the Civil Leave Code, 3rd edition.

This work has been one of great labour and complexity, mainly in consequence of the want of practical information as to the various points of detail involved in it. The results obtained would appear to show that practically about one-fifth to one-sixth of the Members are on furlough allowance, with the following effects upon the average salaries *for subscription purposes*:—

| Years of Service. | Reduction of Average Salary for Subscription purposes. | | |
|---|---|---|---|
| 0– 4 | ·9 per cent. | 9·8 per cent. | |
| 5– 9 | 6·8 „ | | |
| 10–14 | 14·0 „ | | |
| 15–19 | 10·9 „ | 12·2 „ | |
| 20–24 | 13·8 „ | | |
| 25–29 | 20·0 „ | 17·4 „ | |
| 30–34 | 12·0 „ | | |
| All Years of Service | 12·5 „ | | |

The method adopted to give effect to furlough allowances as regards the average salaries is as follows:—

For the first 5 years of Service no deduction has been made.

For the second 5 years of Service the deductions made have been 5, 6, 7, 8, and 9 per cent. respectively.

For the third 5 years of Service the deduction made throughout has been 10 per cent.

For 15 years of Service completed to 34 inclusive, the deduction made has been 12½ per cent. throughout.

After 34 years of Service completed, the deductions made were as follows:— For 35, 36, 37, 38 years of Service, 10 per cent. was deducted; for 39 years of Service, 5 per cent.

Before applying these deductions to the average salary, as brought out in Table A, these average salaries were, to some extent, adjusted in the following manner:—

Starting with 400, as the average salary for year 0, the average salaries for the next 4 years were so calculated as to make such an arithmetical series as would make the total amount of salary equal to that actually payable.

Similarly for years 5–9 and 10–29, the average salaries were adjusted, and so for years 30–39, for which latter and upwards the average salary has been taken as 4,166.

The average salaries as originally deduced in Table A, and the average salaries adjusted in the manner above indicated, and the same, after making the deductions above stated for furlough allowances, are given in the following Table C, some slight adjustments, for the purpose of giving a regular progression, having been made in the averages for 0–4 years of service.

*The third column has been throughout the following calculations taken as the average salary for the calculation of Subscriptions.*

TABLE C.—*Scale of Average Salaries.*

| Years completed from Entry. | Average Monthly Salary. | | Average Monthly Salary on which Subscriptions are calculated | Years completed from Entry | Average Monthly Salary | | Average Monthly Salary on which Subscriptions are calculated |
|---|---|---|---|---|---|---|---|
| | Table A. | Adjusted. | | | Table A. | Adjusted | |
| | Rs. | Rs. | Rs. | | Rs. | Rs. | Rs. |
| 0 | 406 | 400 | 400 | 21 | 2287 | 2324 | 2034 |
| 1 | 418 | 442·5 | 421 | 22 | 2516 | 2410 | 2109 |
| 2 | 481 | 485 | 457 | 23 | 2506 | 2496 | 2184 |
| 3 | 537 | 527·5 | 500 | 24 | 2580 | 2582 | 2260 |
| 4 | 592 | 570 | 545 | 25 | 2765 | 2668 | 2334 |
| 5 | 642 | 622 | 591 | 26 | 2776 | 2754 | 2410 |
| 6 | 705 | 674 | 634 | 27 | 2880 | 2840 | 2485 |
| 7 | 715 | 727 | 677 | 28 | 3151 | 2926 | 2560 |
| 8 | 780 | 779 | 717 | 29 | 3411 | 3012 | 2636 |
| 9 | 806 | 831 | 756 | 30 | 3372 | 3128 | 2737 |
| 10 | 844 | 916 | 824 | 31 | 3394 | 3244 | 2839 |
| 11 | 921 | 1002 | 902 | 32 | 3592 | 3360 | 2942 |
| 12 | 1031 | 1087 | 978 | 33 | 3341 | 3476 | 3041 |
| 13 | 1204 | 1173 | 1056 | 34 | 3500 | 3592 | 3143 |
| 14 | 1422 | 1258 | 1132 | 35 | 3433 | 3708 | 3337 |
| 15 | 1502 | 1460 | 1277 | 36 | 4706 | 3824 | 3442 |
| 16 | 1710 | 1662 | 1455 | 37 | 3645 | 3940 | 3546 |
| 17 | 1889 | 1864 | 1631 | 38 | 3472 | 4056 | 3650 |
| 18 | 2025 | 2066 | 1807 | 39 | 4166 | 4166 | 3957 |
| 19 | 2144 | 2152 | 1883 | 40 | 4166 | 4166 | 4166 |
| 20 | 2183 | 2238 | 1958 | | | | |

In the calculation of the value of the subscriptions paid on Active Service salaries and on Retiring Pensions, it has been assumed that for 40 years from entry and upwards, all the Members will be paying on Retiring Pensions of £1,000 a-year, and that for years from entry 25 to 39 inclusive, the proportion of Members paying on Active Service salaries to those paying on Pensions of £1,000 a-year will be the same as that indicated in the Table in Chapter V. on Retirements—viz., 85 per cent. to 15 per cent., 71 per cent. to 29 per cent., 59 per cent. to 41 per cent., and so on. For simplicity's sake, in the valuation of the subscriptions it has been found convenient to keep the same value of $D_m$ for Active and Retired subscriptions, and to modify the subscriptions themselves. Thus, after 25 years completed from entry, the Active 2½ per cent. subscription is taken as 85 per cent. of 700 rupees, that is 595 rupees; and the Retired 1¼ per cent. subscription as 15 per cent. of 125 rupees, that is 18·7 rupees.

In Table VII. of the Appendix, is given the logarithms of the subscriptions, ordinary and additional, used in the calculation of the value of future subscriptions.

The results thus deduced and made use of are the best that could be under the circumstances obtained. It is no exaggeration to state that enormous labour and very careful consideration have been given to this important question, and it is believed that the results will give as fairly correct an indication of the future as it was possible to obtain. Of course the fact must never be lost sight of that any scale of average salaries cannot be founded on anything like the same sure foundation as rates of mortality, and it is strongly recommended that this question should be constantly watched by the Managers of the Fund. The experience of a particular year will not, however, any more than in the case of rates of mortality, afford any substantially accurate indication of the average results of a number of years; so that any deductions as to rates of subscription, based on one or even two years' experience, might prove extremely untrustworthy, if made the basis of assumptions which are to extend over a number of years.

# CHAPTER VII.

## On the Valuation of Subscriptions.

As stated in Chapter VI., the scale of average salaries in active service from which the amount of the Active-Service Subscriptions has been deduced is that given in the third column of Table C (Chapter VI.), and an explanation has also been given of the manner in which the amount of the Active-Service and Retired Subscriptions from 25 years' service to 40 has been computed. It is proposed in this place to state how the value of the future Subscriptions has been calculated from these data.

The calculation of the value of the 2½ per-cent Ordinary Subscriptions which bear interest at 8 per-cent. has been made from the following formula—

$$\left.\begin{array}{l}\text{Value of future ordinary active Sub-}\\ \text{scriptions for Member who has}\\ \text{completed } m \text{ years from entry}\end{array}\right\} = \frac{S_m}{2} + \frac{(D_{m+1})S_{m+1} + (D_{m+2})S_{m+2} + \ldots}{(D_m)}.$$

Here $(D_m) = \frac{l_m + l_{m+1}}{2} v^m$, where $l_m$ denotes the number living who have just completed $m$ years from entry, according to Table I. of the Appendix, and $v^m = \frac{1}{(1{\cdot}08)^m}$ = present value of 1 due $m$ years hence.

Also $S_m$ denotes the amount of the Active Service Ordinary 2½ per cent. Subscription, as deduced from the third column of Table C (Chapter VI.), after allowing for the proportion who have retired after 25 years from entry.

The above formula has the effect of considering that, at the time of valuation, the Members who have completed $m$ years from entry are just half-way through the following year, and have therefore, on the average, completed $m + \frac{1}{2}$ years from entry: also that the second half of the years' Subscription, viz., $\frac{S_m}{2}$, is due and payable, that the total Subscription for the next year, viz., $S_{m+1}$, will be paid a year hence, or half-way between the beginning and end of the year over which it is payable, and so on for other years.

This method it is considered will express with sufficient accuracy the value of the Subscriptions under the Conditions of the Fund, and it is certain that any attempts to introduce actuarial refinements in dealing with the matter would have little or no appreciable effect upon the values of the Subscriptions, and would

probably tend to introduce an element of complexity which it is very desirable to avoid.

It should be stated that the modified value of $D_m$ here employed, although technically correct, will be found to have small influence on the results, and the ordinary value of $D_m$, as given in Table I., might have been employed without materially over-estimating the value of the future Subscriptions.

The values of the ordinary $2\frac{1}{2}$ per cent. Subscriptions are given in Table I. (A) Appendix.

The values of the 2 per cent. additional Subscriptions for wives, interest at 5 per cent., given in Tables VI. (A) and VI. (B) of the Appendix, have been calculated in an exactly similar manner, but no modification of the ordinary D was made in the calculations, for the reason above stated.

The values of the $\frac{1}{4}$ per cent. additional Subscriptions for daughters, interest at 5 per cent., given in Table X. of the Appendix, have been calculated in a manner similar to that above indicated for the wives' Subscriptions.

The values of the $\frac{1}{8}$ per cent. additional Subscriptions for sons until they attain 21 years of age, interest at 5 per cent., given in Table IX. of the Appendix, have been calculated from the formula—

$$\left.\begin{array}{l}\text{Value of future Subscriptions for son aged } x \text{ last birthday who was born after father had completed } m \text{ years from entry}\end{array}\right\} = \tfrac{1}{2}\left\{\begin{array}{l}\text{Value of future Subscriptions for son just } x \text{ years of age} + \text{Value of future Subscriptions for son just } x+1 \text{ years of age}\end{array}\right\}$$

$$= \tfrac{1}{2}\left\{\frac{S_m D_{x+1} + S_{m+1} D_{x+1} + \ldots}{D_x} + \frac{S_{m+1} D_{x+2} + S_{m+2} D_{x+3} + \ldots}{D_{x+1}}\right\},$$

where $D_x$ denotes the joint life D for son aged $x$, and for his father, the son having been born in father's $\overline{m+1}|$th year from entry.

It has been considered desirable for convenience to give in the Tables VI. (A) and VI. (B) the value of the joint life annuities on the assumptions there given, the curtate annuity values being increased by ·5 throughout.*

---

* If $a$ denote the value of an annuity payable once a year, and $a^{(m)}$ the value of the same annuity payable by instalments $m$ times in a year, then

$$a^{(m)} = a + \frac{m-1}{2m} \text{ approximately.}$$

And if $m$ is infinite, that is, the annuity payable momently, we have—

$$\bar{a} = a + \tfrac{1}{2}.$$

It is true, that this addition of $\frac{1}{2}$ does not involve the rate of interest, but its effect must be considered, by comparing it with the value $a$, to which it is added. Thus (Table I., Appendix), $a_{(10)} = 10\,02$ at 8 per cent., and the addition of $\frac{1}{2}$, is equivalent to increasing the annuity value by nearly 1-20th, or 5 per cent. Whereas $a_{(10)}$, at 5 per cent., is 13 82, and the addition of $\frac{1}{2}$, or ·5 to this is equivalent to increasing the annuity value by 3·62 per cent. only.

The corresponding annuity values (that is, the curtate values increased by ·5) to run while father and daughter are alive and the latter unmarried, are also given in Table X. of the Appendix.

The corresponding annuity values (that is the curtate values) to run while father and son are alive, and the latter has not attained 21 years of age, are also given in Table IX. of the Appendix.

It has also been considered desirable to give in each case the values of log D used in the calculations, as these may be hereafter required for other purposes, and at the same time afford a ready means of checking the various tabulated values.

An examination of the various Valuation Tables in the Appendix will show that the method hitherto adopted in the Fund for the valuation of future Subscriptions has been altogether discarded. For each separate contingent liability brought on to the Fund, not only has the value of the liability been calculated, but also the value of the corresponding Subscriptions, thus doing away with the unsatisfactory features which have hitherto attended the Fund's valuations. The Rates of Mortality obtaining among Members, their widows, and children, can undoubtedly be approximated to with substantial accuracy, and in the foregoing investigations this has been done as far as the materials available enabled it to be done; and even the Rates of Marriage likely to obtain have been attempted to be investigated, although it cannot be said that the results brought out are so likely to prove applicable to the future. But an important step has been made towards improvement, by calculating, as far as possible, the values of the Subscriptions applicable to the various benefits. It is not anticipated that any great fluctuations or variations will hereafter occur as regards the Rates of Mortality and Marriage, as deduced from the 23 years' experience—1850-1872; but it is, without doubt, quite possible, nay almost probable, that no one year's receipts, as regards Additional Subscriptions, would afford a safe guide as to the average receipts from Additional Subscriptions likely to obtain in the future; as this must be based, not only on the scale of Average Salaries, which, if deduced from one year, could not be considered trustworthy under the most favourable conditions, but also on the average number of wives and children (according to sex), and this latter could hardly be predicted from the state of things in any given year, unless the Fund had in every respect become stationary in its character.

The tables, therefore, in the Appendix, relating to the Value of the Subscriptions for wives and children, will be found applicable to the circumstances of the Fund, as they are at the time, and whenever the valuation is made, always, of course, assuming the average scale of salaries to be the same as that which now obtains; and it is believed that, as already stated, this will be found to be a great improvement upon the way the valuations have hitherto been conducted.

## CHAPTER VIII.

### Potential Benefits and Corresponding Additional Subscriptions.

In addition to the contingent liabilities properly so-called in respect of wives and children of existing Members of the Fund, there are the further liabilities in respect of the future wives and children of the said Members, and of Members at present unmarried. It is now proposed to show how these have been dealt with. The rate of marriage among bachelors, as given in Table V. (Appendix), has been employed, in conjunction with the Rate of Mortality given in Table I. (Appendix) to deduce the present value of the Reversionary Annuities to future wives of the said bachelors, that is, to estimate the reserve which should be made in respect of the contingent liabilities hereafter to be brought upon the Fund in consequence of Members marrying who are at present single. Besides, however, the liability in respect of a Reversionary Annuity to future wives of bachelors, there is the further liability in respect of children arising from the marriage of the said bachelors.

A detailed examination of the facts, obtained from the experience of the Fund during the 23 years of observation, would serve to show that the assumption that every marriage will on the average, taken one with another, result in five children being born, corresponds very nearly with the facts, and may be safely taken as a fair basis for the estimation of the reserve to be made on account of children's benefits in respect of future marriages. In calculating the value of these benefits, it has been assumed that a child will be born at the end of the first year from marriage, and at the end of the third, fifth, seventh, and ninth years from marriage respectively. Thus, for a Member marrying in the year following 12 years completed from entry, the value at the time of marriage of the benefits to future children has been computed as follows:

From Tables IX. and X. of the Appendix we see that at 8 per cent., the value of the contingent benefit for a son born in year following 13 years from entry is £91, for a daughter £150, the mean being £120·5; for a son born in year following 15 years from entry is £91, for a daughter £150, the mean being £120·5; for a son born in year following 17 years from entry is £91, for a daughter £150, the mean being £120·5; for a son born in year following 19 years from entry is £105, for a daughter £173, the mean being £139·; for a son born in year following 21 years from entry is £105, for a daughter £173, the mean being £139.

Therefore, value of future children's benefits at time of marriage—

$$= £\frac{(D_{13}+D_{15}+D_{17})120{\cdot}5+(D_{19}+D_{21})139}{D_{12}}.$$

Now (Table I., Appendix) $D_{13}= 3125\cdot$ $D_{19}=1798\cdot$,

$D_{15}= 2601\cdot$ $D_{21}=\frac{1495\cdot}{3293}$,

$D_{17}= \frac{2163\cdot}{7889\cdot}$

$D_{12}= 3425\cdot$

Thus value of future children's benefits at time of marriage, Member being married in year following 12 years from entry, interest at 8 per cent. $= £\frac{7889\times120{\cdot}5+3293\times139}{3425}$

$= £411.$

By the use of the results thus obtained, and which are given in Table XII., Appendix, combined with the rate of marriage in Table $V_y$ Appendix, the values given in Table XI., Appendix, have been calculated, and in a precisely similar manner the values of the future subscriptions in respect of such children have been calculated. It should be stated, however, that in making these calculations no allowance has been made for the rule of the Fund requiring Members marrying after retirement, and having children, to pay at full rates.

In the said Table has been also given the present value of the additional subscriptions hereafter payable by bachelors in respect of their future wives, as there was not sufficient printing space for these figures in Table V., Appendix, where they should properly appear.

The remaining contingent potential benefit to be estimated is the liability in respect of future born children to Members already married.

This is one of the liabilities as to which it would seem that the reserve hitherto made has been inadequate. The results obtained by Mr. Brown appear, among other things, to have been vitiated by the fallacy that in ascertaining the number of children to married Members, according to the latter's ages, he did not include all children born to such Members, but only those living at the date of investigation. On pp. 40 and 41 of his First Report, Mr. Brown alludes to Mr. Griffith Davies' opinion that the reserve for this liability should not be less than 25 per cent. (? what rate of interest is employed) of the value of the contingent pensions to children of married Members then living, and proceeds to show that, using 5 per cent. interest, a reserve of less than 20 per cent. would, in his opinion, be sufficient. It should, however, be stated that Mr. Brown makes a further reserve, though small in amount, which is included in his reserve for future wives, and children by such wives.

It is doubtful if any method can be devised which would satisfy exactly all the conditions involved in the question; but the attempt here made, it is hoped,

will, if not theoretically perfect, furnish results reasonable in themselves, and probably somewhat on the safe side.

The number of married Members (first, second, and third marriages) existing at 31st December 1872, was 511, and the following Table shows how long they had been married, and the number of children that had been born to them up to that date :—

| Years after First Marriage. | No. of Married Members. | | No. of Children born | | Average per Member. | |
|---|---|---|---|---|---|---|
| 0 | 20 | | 3 | | ·15 children | |
| 1 | 28 | | 19 | | ·68 „ | |
| 2 | 20 | 105 | 23 | 103 | 1·15 „ | Average, 1 child. |
| 3 | 13 | | 19 | | 1·5 „ | |
| 4 | 24 | | 39 | | 1·6 „ | |
| 5 | 15 | | 32 | | 2·1 „ | |
| 6 | 13 | | 40 | | 3·1 „ | |
| 7 | 17 | 85 | 45 | 257 | 2·7 „ | Average, 3 children. |
| 8 | 11 | | 41 | | 3·7 „ | |
| 9 | 29 | | 99 | | 3·4 „ | |
| 10 | 25 | | 82 | | 3·3 „ | |
| 11 | 22 | 63 | 93 | 256 | 4·2 „ | Average, 4 children. |
| 12 | *16 | | 81 | | 5·1 „ | |
| 13–22 | 125 | | 653 | | 5·2 „ | |
| 23–32 | 82 | | *512 | | 6·2 „ | |
| 33 & upwards | 51 | | 319 | | 6·2 „ | |
| TOTAL . | 511 | | 2,100 | | ... | |

The 39 Widowers existing at the same date had had born to them 157 children

Taking these figures as our guide, it does not appear to be an unreasonable assumption that married Members, who have been married on the average 0–4 years, will, if they live long enough, have born to them hereafter on the average 4 children; that Members who have been married on the average 5–9 years will, in the same way, have born to them hereafter on the average 2 children; that Members who have been married on the average 10–12 years will, in the same way, have born to them hereafter on the average 1 child; and that Members who have been married 13–22 years will hereafter have born to them on the average somewhat less than 1 child per Member.

It further appears that the average time after entry into the Service at which Members marry, who marry at all, is about 7½ years, so that the 511 Married Members may fairly be taken as thus distributed, according to years from entry into the Service :—

| Years completed from Entry | No. of Married Members on the assumption that Marriage took place 7½ Years from Entry. | | No. of Married Members according to the facts. | |
|---|---|---|---|---|
| 0– 6 | nil | | 33 | |
| 7–12 | 105 | | 104 | |
| 13–17 | 85 | | 94 | |
| 18–20 | 63 | | 38 | |
| 21–30 | 125 | | 113 | |
| 31–40 | 82 | 133 | 45 | 129 |
| 41 and upwards | 51 | | 84 | |

The foregoing table shows the number of married Members, according to years completed from entry, as deduced on this assumption, and according to the actual facts. It is not necessary here to enter into any explanation of the discrepancy which would appear to exist between the two sets of results, although it may be remarked how it is clearly unadvisable, except where unavoidable, to make use of the method of general averages in such matters. It will be evident, however, that it will be by no means an unreasonable assumption, looking at the past experience of the Fund, to consider that the 33 Members between 0–6 years from entry have had on the average ·5 children, and may therefore be expected on the average to have born hereafter 4·5 children; that the next 104, between 7–12 years from entry, will have born hereafter 4 children on the average per Member; that the next 94, between 13–17 years from entry, will have born hereafter 2 children on the average per Member; that the next 38 Members will have born hereafter on the average 1 child per Member; that the next 113 will have born hereafter on the average ·5 children per Member. This will give the following as the potential benefits to be provided for approximately :—

| Years from Entry | No. of Members. | Children hereafter to be born. |
|---|---|---|
| 5 (say) | 33 | 4·5 |
| 10 | 104 | 4 |
| 15 | 94 | 2 |
| 20 | 38 | 1 |
| 25 | 113 | ·5 |
| 26 & upwards | 129 | nil |
| TOTAL . | 511 | ... |

Now in Table XII. is given the value at time of marriage of the potential benefits to 5 children assumed hereafter to be born if the father should live long enough; and it will be sufficiently near to take the proportions which 4·5, 4, 2, 1, and ·5, bear to 5, as the proportions which would fairly indicate the relative value of the potential benefits to married Members of a given standing, as compared with the potential benefits to bachelors just about to marry of the same standing. The process thus indicated is shown in the following table :—

| Years from Entry. | Value of Potential Children's benefit to Bachelors if Marriage take place at once. | | Value of Potential Children's benefit to Married Members. | | Value of Potential Children's benefit to existing Married Members. | |
|---|---|---|---|---|---|---|
| | 3 per cent. | 5 per cent. | 3 per cent. | 5 per cent. | 3 per cent. | 5 per cent. |
| | | | | | £ | £ |
| 5 | 358·2 | 682·4 × ·9 | = 322·4 | 614·2 × 33 | 10,639 | 20,269 |
| 10 | 392·1 | 750·4 × ·8 | = 313·7 | 600·3 × 104 | 32,620 | 62,430 |
| 15 | 447·7 | 854·2 × ·4 | = 179·1 | 341·7 × 94 | 16,835 | 32,120 |
| 20 | 528 2 | 999·2 × ·2 | = 105·6 | 199·8 × 38 | 4,013 | 7,592 |
| 25 | 630·6 | 1,177·0 × ·1 | = 63·1 | 117·7 × 113 | 7,130 | 13,300 |
| TOTAL | ... | .. | ... | ... | 71,237 | 135,711 |

We now proceed to calculate the value of the future subscriptions on account of children hereafter to be born to existing married Members.

Table XII., Appendix, gives those values in respect of bachelors on the point of marrying, on the assumption that 5 children will be born to each bachelor after marriage, if he live long enough; and using these values, just in the same way as before, for the benefits, the following table shows the process by which the values of the future subscriptions of married members in respect of children hereafter to be born, is calculated :—

| Years from Entry. | Value of Additional Subscription for Children of Bachelors just about to marry. Interest at 5 per cent. | | Value of Additional Subscriptions for future Children of married Members. Interest at 5 per cent. | | Value of Additional Subscriptions for future Children of existing Married Members. Interest at 5 per cent. | |
|---|---|---|---|---|---|---|
| | Active. | Retired. | Active. | Retired. | Active. | Retired. |
| | Rs. | Rs. | Rs. | Rs. | Rs. | Rs. |
| 5 | 1,162 | 45·71 × ·9 | = 1,046 | 41· × 33 | 34,518 | 1,353 |
| 10 | 1,202 | 88·22 × ·8 | = 962 | 71· × 101 | 100,048 | 7,384 |
| 15 | 1,013 | 148·5 × ·4 | = 405 | 59· × 94 | 38,070 | 5,546 |
| 20 | 615 | 219·2 × ·2 | = 123 | 44· × 38 | 5,412 | 1,672 |
| 25 | 257 | 260·3 × ·1 | = 25·7 | 26· × 113 | 2,914 | 2,938 |
| TOTAL . | ... | .. | ... | ... | 180,962 | 18,893 |

It will be seen that the value of the benefits, as estimated at 8 per cent., is £71,237; and as the value of the contingent benefits to existing children is £233,824, at 8 per cent., the reserve thus brought out for future children of existing married Members is 30·4 per cent. of the reserve for existing children of the said Members. This estimate is in excess of the minimum of 25 per cent., which, in the late Mr. Griffith Davies' opinion, should represent the reserve for this liability; but there does not appear to be any ground for considering it an excessive estimate, particularly when it is borne in mind that it represents not only the reserve for future children by existing wives, but by future wives. It considerably exceeds the reserve as brought out by the methods used by Mr. Brown, but, as already indicated, these methods appear to be in various respects open to serious objection.

# CHAPTER IX.

## Valuation as at 31st March 1873.

Having in the previous portion of this Report stated how the various tables for the valuation of the benefits and subscriptions have been calculated, there remains now to state the results obtained by the employment of these tables, in the actual valuation of the Fund's liabilities and assets.

As the particulars appertaining to the existing Members were, at the time this valuation was made, only available up to 31st December 1872, this date was taken throughout as the valuation date for the contingent liabilities. The valuation of the incumbent pensions was made as at 31st March 1873, from the manuscript particulars furnished by the managers of the Fund. The difference of three months between the two valuation dates will not, it is believed, have any effect worthy of notice on the results of the valuation, as the alterations in the Fund during that interval of three months appear to have been of no magnitude. It would, of course, be theoretically necessary that the valuation date should be the same throughout, but as this would have led to some considerable delay in the presentation of this Report, and would, under the circumstances of the case, not have had any substantial effect upon the results, it was considered desirable not to increase the delay. It is, therefore, to be borne in mind that, as regards this valuation, the contingent benefits and assets are valued as at 31st December 1872, and the incumbent pensions as at 31st March 1873—the amount of the realised assets being taken as at the latter date.

### (1.)—Incumbent Liabilities.

The pensions, under the old rules, to widows have been valued, as heretofore, by means of Table II. on p. 7 of Mr. Brown's Second Report,—the usual provision being made for their being payable half-yearly in advance. Three pensions, although inserted in the manuscript particulars, do not appear to have been valued in the Fund valuation. Whether they were properly omitted has not been ascertained, but their value, £3,651, has been included in the present valuation.

The old rule pensions to daughters have been valued by Table III. in the Appendix to this Report, the usual provision being made for their being payable half-yearly in advance. No provision has been made for marriage portions. Whether this should be so or not, did not appear; but the Fund valuation has been followed in this respect.

The new rule pensions to widows have been valued by Table VIII. in the Appendix to this Report, both on the assumption that they will be reduced one-half on re-marriage, and that they will continue throughout life for the full amount. It should be stated that there was nothing to indicate in the Fund valuation which pensions were at the time actually reduced one-half by re-marriage, as they had all been valued by the same annuity values, the said values being those allowing for reduction of the annuity by one-half in the event of future re-marriage.

The new rule pensions to daughters have been valued by Table III. of the Appendix, and the marriage-portions by Table IV. The separation made in the Fund valuation of motherless daughters has been adhered to.

The new rule pensions to sons, with a like separation of motherless sons, have been valued by Table II. of the Appendix.

The four special pensions have been taken at the values put upon them in the Fund valuation.

### (2.) Contingent Benefits.

The existing Members, active and retired, were separately classified under years from entry into the Service as at 31st December 1872, a separate classification being made for married, bachelor, and widower Members.

The ordinary subscriptions have been valued by Table I. (A) Appendix.

The values of the contingent liabilities in respect of married Members' wives were then determined by means of Table VI. (A) and Table VI. (B) of the Appendix, the difference between the two giving the additional reserve for future wives of married Members. These values were deduced on the two assumptions :—

*Firstly.*—That widows' pensions would be reduced one-half on re-marriage.

*Secondly.*—That no reduction of pensions would take place on re-marriage.

In the present Valuation it must be remembered that no allowance has been made for the liability in respect of widows' pensions that have been reduced one-half by re-marriage, reverting back to the full amount on the death of the second husband. The value of this liability would certainly be small, in comparison with most of the other items.

The corresponding values of additional subscriptions for wives are also deduced from the same Tables. The children of the said married Members, sons and daughters, were classified under their father's years from entry into the Service at the time of birth, and then into present ages last birthday as at 31st December 1872. The first part of this classification is here given :—

| Born in Father's Years of Service. | Number of Sons. | | Number of Daughters. | | Taken in Valuation as born in years of Service. |
|---|---|---|---|---|---|
| | Of Active Members. | Of Retired Members. | Of Active Members. | Of Retired Members. | |
| 0- 2 | 18 | . | 24 | 1 | 0 |
| 3- 7 | 126 | . | 132 | 15 | 5 |
| 8-12 | 181 | 10 | 187 | 29 | 10 |
| 13-17 | 119 | 26 | 119 | 41 | 15 |
| 18-22 | 53 | 38 | 51 | 72 | 20 |
| 23-27 | 27 | 38 | 38 | 54 | 25 |
| 28-32 | 5 | 34 | 2 | 34 | 30 |
| 33-37 | ... | 13 | 1 | 14 | 35 |
| 38-42 | . | 9 | .. | 8 | 40 |
| 43-47 | ... | 4 | ... | 3 | 45 |
| 48-51 | . | 1 | | 2 | 50 |
| | 529 | 173 | 554 | 273 | |

The other part of the classification under years of age last birthday having been made, the values of the benefits were taken out from Tables IX. and X. of the Appendix, together with the value of the subscriptions, active and retired. It should be stated, that the values of retired Members' subscriptions were all calculated on the assumption that the father's retiring pension was £1000 per annum, the annuity values given in the tables furnishing a ready means of calculating the subscription values.

### (3.)—Contingent Potential Benefits.

The values of the bachelors' and widowers' potential benefits on account of future wives (both allowing for reduction of pension on re-marriage of widow, and not allowing for reduction), and the corresponding subscription values, were deduced from Tables V. and XI. of the Appendix, after the bachelors and widowers had been duly classified under years from entry, the active Members and retired Members being kept separate. The values of annuitants' subscriptions were approximated to by adding to the tabular retired subscription values one-half the corresponding active subscription values.

Similarly, the values of the bachelors' and widowers' potential benefits on account of future children, and the corresponding subscription values, were deduced from Table XI. of the Appendix, as also the corresponding value of additional subscriptions for children, the said values for annuitants being approximated to in the same manner as for wives.

The values of the potential benefits for future children of existing married Members, and the corresponding subscription values, have been calculated in Chapter VIII.

The appended statement (A) shows the results of the valuation of the incumbent pensions and contingent benefits, actual and potential, together with the corresponding subscription values; and the statement (B) shows the particulars of the Valuation Balance Sheet.

STATEMENT A.—*Valuation of Benefits and Subscriptions as at* 31 *March* 1873.

| | Value of Benefits. | | | Value of Subscriptions. | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | At 8 per cent. (Ordinary). | | | At 5 per cent. (Additional). | | |
| | At 8 per cent. | At 5 per cent. | | Active. | Retired. | Annuitants. | Active. | Retired. | Annuitants. |
| | £ | £ | | Rs. | Rs. | Rs. | Rs. | Rs. | Rs. |
| Incumbent Pensions:—Old Rules—to Widows | 103,386 | | Existing Married Members | 1,263,933 | 149,705 | 91,650 | | | |
| „ „ to Daughters | 33,965 | | Do. on account of Wives (present and future) | . | ... | .. | 1,244,022 | 185,780 | 78,260 |
| | 137.351 | | Do. do. Daughters existing (including Widowers) | .. | ... | ... | 194,831 | 26,535 | 14,337 |
| Deduct first Quarter already paid | 4,570 | | Do. do. Sons existing (including Widowers) | ... | ... | ... | 84,521 | 7,623 | 3,374 |
| | 132,781 | | Do. do. future Children | .. | ... | ... | 180,962 | 18,893 | . . |
| Incumbent Pensions:—New Rules—to Widows | 254,245 | 330,159 | | | | | | | |
| [Allowance for non-reduction of Pensions on re-marriage | 5,142 | 7,770] | Existing Bachelors & Widowers | 920,207 | 53,790 | 22,444 | | | |
| Do. do. to Daughters | 85,379 | 112,095 | Do. on account of future Wives | ... | ... | ... | 587,768 | 62,031 | 5,397 |
| Do. do. „ (Marriage Portion) | 9,912 | 11,844 | Do. do. future Children | . | ... | .. | 159,447 | 16,999 | 1,351 |
| Do. do. to Motherless Daughters | 24,946 | 32,802 | | | | | | | |
| Do. do. „ „ (Marriage Portion) | 2,067 | 2,409 | Total | 2,184,140 | 203,495 | 114,094 | 2,451,551 | 317,861 | 102,719 |
| Do. do. to Sons | 48.210 | 54,078 | | | | | | | |
| Do. do. to Motherless Sons | 6,320 | 6,910 | | | | | | | |
| Four special Pensions | 2,645 | 3,566 | Value of Government Donation at $\frac{24,074}{821}$ Rs. per Member | . | 219,210 | | | | |
| Contingent Benefits:—To present Wives of existing Members | 332,960 | 555,445 | | | | | | | |
| [Allowance for non-reduction of Pensions on re-marriage | 15,336 | 28,656] | | | | | | | |
| Do. do. to existing Daughters of existing Married Members | 180,343 | 296,173 | | | | | | | |
| Do. do. to existing Sons of existing Married or Widowed Members | 53,481 | 68,588 | | | | | | | |
| Potential Benefits:—On account of future Wives of existing Bachelors and Widowers | 86,070 | 188,010 | | | | | | | |
| [Allowance for non-reduction of Pensions on re-marriage | 6,226 | 13,288] | | | | | | | |
| Do. do. on account of future Children of existing Bachelors and Widowers | 61,899 | 135,127 | | | | | | | |
| Do. do. on account of future Children of existing Married Members | 71,237 | 135,711 | | | | | | | |
| Do. do. on account of future Wives of existing Married Members | 27,609 | 59,701 | | | | | | | |
| [Allowance for non-reduction of Pensions on re-marriage | 962 | 2,225] | | | | | | | |

## STATEMENT B.—*Valuation Balance Sheet as at 31st March 1873.*

| | | Ordinary Branch. | | | Additional Branch. | | |
|---|---|---|---|---|---|---|---|
| | | | Undistributed. | Distributed. | | Undistributed. | Distributed. |
| | **LIABILITIES.** | £ | £ | £ | £ | £ | £ |
| A | Old Rule Pensions | 137,351 | | | | | |
| | Deduct for first Quarter, already paid | 4,570 | 132,781 | | | | |
| B | New Rule Pensions—Incumbent | 433,724 | ... | ... | 553,863 | | |
| | Contingent, actual | 566,784 | ... | ... | 920,206 | | |
| | Contingent, potential | 246,815 | ... | ... | 518,549 | | |
| | Additional for Sons | | | | | | |
| | Total | 1,247,323 | ... | 1,247,323 | 1,992,618 | .. | 1,992,618 |
| C | Deduct value of one-sixth deduction | | | | | | |
| D | Total value in Pounds sterling in England | ... | 132,781 | 1,247,323 | 1,992,618 | ... | 1,992,618 |
| | | Rs. | Rs. | Rs. | Rs. | Rs. | Rs. |
| E | *Converted into Rupees in India* | 9·75034=£1 | 1,294,660 | 12,161,823 | 10·0199=£1 | .. | 19,965,830 |
| F | *Add loss in exchange by using Subscriptions* | ... | 6,502 | .. | ... | 1,000 | |
| G | *Cost of Establishment, &c.* | ... | ... | 105,532 | ... | ... | 141,433 |
| H | *Amount due for adjustment with Government:—* | | | | | | |
| | Amount of Bill. Due Date. | | | | | | |
| | Old Rules . . Rs. 80,000 + 4 per cent. . . 1 July, 1873 | 81,568 | | | | | |
| | 65,000 + 4 „ . . 30 Dec., 1873 | 63,773 | 145,341 | | | | |
| K | New Rules . . Rs. 110,000 + 4 „ . . 1 July, 1873 | 112,156 | ... | ... | 112,987 | | |
| | 120,000 + 4 „ . . 30 Sept., 1873 | 120,000 | ... | ... | 121,756 | | |
| | 135,000 + 4 „ . . 30 Dec., 1873 | 132,452 | ... | ... | 135,325 | | |
| | 120,000 + 4 „ . . 31 March, 1874 | *omitted.* | ... | 364,608 | *omitted.* | ... | 370,068 |
| | *Due for refund of Composition* | ... | 5,626 | ... | | 3,751 | |
| | Total Liabilities in Rupees in India | ... | 1,452,129 | 12,631,963 | ... | 4,751 | 20,477,331 |
| | **ASSETS.** | | | | | | |
| L | *Realized, as per Accounts* | ... | 7,354,036 | .. | ... | 3,857,597 | |
| M | *Interest due, but not realized, Rs.* 241,810, *less* ¼ *per cent.* | .. | 240,601 | | | | |
| N | Future Subscriptions, by new tables:— | | | | | | |
| | By present Members, during active service | 2,184,140 | ... | ... | 2,451,551 | | |
| | By present Members, after retirement | 203,495 | ... | ... | 317,861 | | |
| | By present Annuitants | 114,094 | ... | ... | 102,719 | | |
| | | | 2,501,729 | ... | | 2,872,131 | |
| O | Add amount due on 1st April | | | | | | |
| P | Minimum payments, *i.e.*, to make up balance to | ... | ... | | | | |
| Q | Government donation of £2.500 per annum at $\frac{24,074}{821}$ rupees per Member. | ... | 219,210 | | | | |
| R | Fines | | | | | | |
| | *By amount due from Annuity Fund* | ... | 1,080 | ... | ... | 720 | |
| | Total Assets in Rupees in India | ... | 10,316,656 | ... | ... | 6,730,448 | |

NOTE.—The items in italics are taken from the Fund Valuation (*see* Chapter IX.)

In Statement A will be found, subject to the condition already alluded to, the values, as at 31st March 1873, of the benefits and of the subscriptions, and in Statement B will be found particulars of the valuation as at the same date.

From the former statement it will be seen, that the additional reserve brought out for future wives of existing married Members is estimated to be worth £27,609, at 8 per cent., and £59,701, at 5 per cent.; values which do not differ much from those brought out by Mr. Brown's method for future wives and future children by the said wives.

It should be stated that, in valuing the subscriptions of Members now retired, as it appeared that 36 per cent. of the said Members had compounded, this deduction has been made from the value obtained on the assumption that they were all still paying the subscriptions for retired Members, the said subscriptions being assumed to be calculated on pensions of £1,000 a-year.

It will be noted also that the values of the subscriptions on account of wives are calculated by Table VI. (B). Allowing both for subscriptions on account of present and future wives, the difference between the estimated values for present wives only and for present and future wives was found to be 94,255 rupees active, and 32,304 rupees retired, and 3,418 rupees on account of annuitants.

It has not been thought proper to make any allowance on account of one-sixth deductions, in the event of a Member dying at an early stage of Service. Such cases are the very cases which any plan of insurance is intended more particularly to meet, and, whatever may be said for such a rule in the early stages of the Fund, there cannot be any reasonable ground for retaining it at the present time. Accordingly, this item has not been recognised in the valuation, and in any revision of the Rules of the Fund, this rule would appear to call for reconsideration.

The next four items—E, F, G, H,—have been taken from the printed valuation statements issued by the Fund, and it must be distinctly understood that the present reference does not undertake any of the responsibility connected with them. The questions of exchanges, of management expenses, and of financial adjustments with the Government, based on the said exchanges, are matters with which this Report does not profess to deal, particularly as they appear to be of a nature as to which the Members of the Fund are themselves perfectly well qualified to judge.

The items L and M have, in the same way, been taken from the Fund valuation statements.

The item O has not been recognised on account of the methods used in valuing the subscriptions (See Chapter VII.).

The item P has also been passed over. This would only occur in cases of premature retirements on invalid pensions, and it has been already stated that this question has not been dealt with. It is at least doubtful, however, whether such an item should be anticipated in a valuation.

The item Q has been thus dealt with. Taking the 821 existing Members, and assuming the Fund estimate of 24,074 rupees per annum, this would give $\frac{24,074}{821}$ Rs. per Member, as the annual donation in respect of each Member, and this amount has been capitalized for each Member, by the annuity values of Table I. of Appendix.

The item R, assumed to be the prospective value of fines on account of disparity of the husband's and wife's ages, has not been valued. If brought into account, then the corresponding additional liability (if any) should also be brought into account. As already stated, however, in Chapter III., there does not appear to be any objection to the continuance of the rule requiring the payment of this fine.

Adopting the method indicated in the Fund valuations for the apportionment of the liabilities between the ordinary and additional branches, we have the following results in rupees :—

Ordinary Branch.—Liabilities ... $1,452,129 + 12,631,963m$.
Assets ..... 10,316,656

From which it appears that the proportion of the liabilities, as at date of valuation, which the Ordinary Branch could provide, is given by

$$m = \frac{8,864,527}{12,631,963} = \cdot 70175$$

Additional Branch.—Liabilities ... $4,751 + 20,477,331\ (1-m)$.
Assets ..... 6,730,448

Putting $1-m = \cdot 29825$, gives the value of the liabilities which are required to be met by the additional branch to be 6,107,364 rupees; and the assets of this branch being 6,730,448, there appears to be a surplus of 618,333 rupees.

The estimated surplus on the Fund valuation as at same date was 2,687,226 rupees; or, "after the Government claim is fully satisfied," 2,235,172 rupees.

Bearing in mind, however, the peculiar nature of the benefits granted to the Members, and the no less peculiar manner in which these benefits are paid for, the estimated surplus brought out by means of the tables hereto appended, and which are calculated from the experience of the Fund, represents to the full extent the surplus which could be properly treated as such. It is believed that the said tables fairly represent, with perhaps a tendency to the safe side, the values of the

benefits and corresponding subscriptions, after allowing for the alterations in the rules which have been above suggested as desirable, and this estimated surplus of 618,333 rupees could accordingly be safely divided in some manner or other among those interested in the Fund.

It will be useful now to compare the value of the actual benefits granted by the Fund, as estimated in this Report, with the value of the corresponding subscriptions at the time Members enter the Fund.

Assuming a Member not to be married at time of entry into the Service,

| | | |
|---|---|---|
| The value (Table V. Appendix) of the Potential Benefits on account of wives is ... ... ... | £279 | at 8 per cent. |
| The value (Table XI. Appendix) of the Potential Benefits on account of children is ... ... ... ... | £192 | „ „ |
| | £471 | |

This £471, converted into rupees at 9·75 rupees=£1, being the ratio used in the Fund valuations, is 4,592 rupees.

The value, Table I. (A), of the ordinary 8 per cent. Subscription of 2½ per cent. on salary is—

| | | |
|---|---|---|
| Active, 2,763 rupees; Retired, 85 rupees—together ... | 2,848 | rupees. |
| Value of Government Donation ... ... ... ... | 308 | „ |
| | 3,156 | „ |

If we add to this 60 rupees on account of the tabular subscription values being calculated on the assumption that, at time of valuation, half the first year of Service is completed, we get 3,156+60 rupees=3,216 rupees.

From which we get, as the proportion of liabilities covered by the ordinary 8 per cent. subscription $\frac{3,216}{4,592} = \cdot70034$ very approximately.

The ratio does not differ much from that already ascertained as the proportion of liabilities which the Ordinary Fund could meet, as at 31st March 1873, being ·70034, as against ·70175. The closeness of these two results is somewhat noteworthy, and would tend to show that, assuming the original 2½ per cent. ordinary subscription to have been intended to meet as large a proportion of the benefits assured as practicable, the amount of late years debited and credited to that Fund cannot have been, on the whole, much outside the mark. At the same time, so many disturbing elements (including the Old Rule liabilities) appear to have been introduced into the question, that it would be difficult to say, without an elaborate enquiry into the facts, whether the 8 per cent. Fund has failed to be charged with its proper proportion of liabilities, and, if so, to what extent. At all events, assuming the estimates made in the tables hereto appended, both

as to the values of benefits and subscriptions, to be correct for Members now entering the Service, the proportion of liabilities to be charged against their ordinary subscriptions should not exceed 70 per cent. If the analysis of the values of benefits and subscriptions for bachelors indicated above be extended, it will be found that for certain years of Service, the estimated value, at 8 per cent., of the potential benefits to wives and children is below that of the estimated value of the ordinary subscription, so that for a certain portion of the bachelors (and widowers) the reserve required would be a negative quantity. It has not, however, been thought desirable in this valuation to eliminate these negative values, the Members of the Fund having been treated as a whole, so that the excess in value of the subscriptions, as compared with the benefits at one stage, would be applied to meet the reserve required at another stage, where the value of the benefits exceeded that of the subscriptions as estimated.

It should be added, in connection with this point, that had the rule been in force under which full rates were charged on pensions, the estimated value of the additional subscriptions in the 5 per cent. branch for potential wives and children would have been somewhat more than sufficient to meet the liabilities required to be charged against the Additional Branch. As matters are, the value of the additional subscription is barely sufficient, according to the tables in this Report, to cover this 29·966 per cent. of the liabilities.

Other matters in connection with this Valuation will be found referred to in Chapter XI.

# CHAPTER X.

## Examination of Experience, from 1st January 1873, to 1st January 1878.

Before making the valuation, as at 31st March 1878, it seemed desirable to test the tables calculated from the 23 years' experience, ending 31st December 1872, by the results of the five years ending 31st December 1877, and accordingly the principal facts of those five years were taken out and compared with the results to be expected by the tables deduced from the Fund's previous experience.

They are shown in the following table :—

| Years completed from Entry | Bachelors exposed to risk of Marriage | Marriages. | | Members exposed to risk of Death. | Deaths. | |
|---|---|---|---|---|---|---|
| | | Expected. | Actual | | Expected | Actual |
| 0– 4 | 561 | 44·3 | 32 | 671 | 7·51 | 11 |
| 5– 9 | 310 | 31·0 | 26 | 541 | 7·01 | 5 |
| 10–14 | 249 | 32·4 | 20 | 735 | 10·66 | 7 |
| 15–19 | 95 | 7·6 | 7 | 580 | 8·82 | 12 |
| 20–24 | 36 | | | 360 | 5·80 | 4 |
| 25–29 | 30 | | | 349 | 6·63 | 3 |
| 30–34 | 35 | | | 293 | 6·94 | 6 |
| 35–39 | 7 | 4·8 | 4 | 120 | 3·59 | 3 |
| 40–44 | 18 | | | 201 | 7·94 | 2 |
| 45–49 | 31 | | | 258 | 13·85 | 11 |
| 50–54 | 6 | | | 62 | 5·29 | 4 |
| 55–59 | | | | 14 | 2·10 | 2 |
| 60–64 | | | ... | 7 | 2·20 | 1 |
| | 1,605 | 120·1 | 89 | 4,191 | 88·34 | 71 |

As regards the rate of marriage among bachelors, it will be observed that during this five years it has, apparently, been less than previously. There are various sets of circumstances likely to bring about such a result, and, as already intimated, this must, in the present condition of the Fund, be looked upon as a very uncertain element in the constitution of the Fund. Alterations in the limits of age at entry into the Service, or in the average salaries of the young Members, or various other matters, into which it is unnecessary to enter, will bring about considerable fluctuations in the rate of marriage among the younger Members of the Service, and all that can be done is to use such a rate in the calculations as, while following the indications of the past experience, shall amply cover any fluctuations that may arise in this important element.

It will be seen that for the last five years the rate of marriage has been considerably less than that indicated by Table V. of the Appendix, although, at the same time, there is nothing to show that the rate in the table is excessive; as in its construction the experience of the Fund was tolerably well adhered to, always with a tendency to the safe side.

As regards the rate of mortality, the experience of the last five years agrees fairly well with the results to be anticipated from the past experience of the Fund, as given in Table I. of the Appendix. The numbers at risk have been calculated near enough for all practical purposes, and, on the whole, the actual deaths may be considered as fairly agreeing with those expected by Table I. of the Appendix. The excess of the actual deaths over the expected, at years of Service 0–4, arising from three bachelors dying very soon after entry, is believed to be somewhat accidental, but in the important periods 5–9, 10–14, 15–19, 20–24, the agreement is as close as could be expected from the comparative smallness of the numbers exposed to risk.

The rates of mortality and re-marriage of incumbent widows, and the rates of mortality of sons and daughters, and the rate of marriage of the latter, it was not considered necessary to enter into.

## CHAPTER XI.

### Valuation as at 31st March 1878.

Before entering into details on this subject, it should be stated that, although a very careful examination of the materials furnished was made, it was found impossible to make the particulars for valuation agree exactly with those set out in the Report of the Managers, dated 29th January 1879. Thus the number of married members was found from the copy Register furnished to be 346 active, and 192 retired—together 538; the widowers, 21 active, and 28 retired, and bachelors, 250 active, and 27 retired, together 271 active, and 55 retired. Whereas the corresponding figures given in the Fund Valuation are, married, 344 active, and 197 retired; bachelors and widowers, active and retired, together 323. The total number of Members agrees, namely, 864.

Again, the number of sons with contingent benefits was found to be 518 of active, and 226 of retired Members—together, 744; and daughters, 561 of active, and 344 of retired Members—together, 905. Whereas the Fund Valuation gives, sons, 517 of active, and 234 of retired Members—together, 751; and 557 daughters of active, and 353 of retired Members—together, 910.

These discrepancies will not in any way materially affect the results of the Valuation, but they are mentioned here in order to anticipate notice of them, and to cause attention to be called to the manner in which the copy Registers are written up. Although these are, in the main, no doubt, correct, yet it is evident that the manner of keeping these important records is capable, in some respects, of improvement. Possibly the above-mentioned discrepancies arise from the copy Registers being written up some time after 31st March 1878, and after the particulars had been taken out for the Fund Valuation, and additional information had been received from the Members. It should also be added that great difficulty was found in dealing with the information as to retirements, the difficulty arising principally from the varying phraseology used in writing up the Registers.

These matters have been mentioned, partly because some slight changes in the manner of writing up the Registers would save great trouble in future investigations, should they be required, and partly because considerable delay in the presentation of this Report has been brought about from the doubt hanging over various entries, thus necessitating much circumspection in dealing with them. It is believed that the facts as taken out throughout the present investigations are, on the whole,

correct, although from the causes above stated, slight discrepancies may be found. It should, however, be added that, in some few respects, the Registers are palpably incorrect, and more particularly with regard to wives and children.

The following Table A gives the classification, for the purposes of the Valuation, of the Members existing as at 31st March 1878, and Table B gives the corresponding classification of their sons and daughters existing at the same date and entitled to benefits:—

TABLE A.—*Classification of Members as at 31st March* 1878.

| Years completed from Entry. | MARRIED. | | WIDOWERS. | | BACHELORS. | | Years completed from Entry. | MARRIED. | | WIDOWERS. | | BACHELORS. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Active. | Retired. | Active. | Retired. | Active. | Retired. | | Active. | Retired. | Active. | Retired. | Active. | Retired. |
| 0 | 3 | ... | ... | ... | 24 | ... | 34 | 2 | 5 | ... | 2 | ... | ... |
| 1 | 2 | ... | ... | ... | 19 | ... | 35 | 1 | 12 | ... | 4 | ... | 5 |
| 2 | 1 | ... | ... | ... | 22 | ... | 36 | ... | 5 | ... | ... | ... | ... |
| 3 | 6 | ... | ... | ... | 18 | ... | 37 | 1 | 11 | ... | ... | ... | 1 |
| 4 | 8 | ... | ... | ... | 16 | ... | 38 | ... | 2 | ... | 2 | ... | 1 |
| 5 | 4 | ... | ... | ... | 24 | ... | 39 | ... | ... | ... | ... | ... | ... |
| 6 | 16 | ... | ... | ... | 20 | 1 | 40 | ... | 6 | ... | ... | ... | ... |
| 7 | 12 | ... | ... | ... | 11 | ... | 41 | ... | 6 | ... | ... | ... | ... |
| 8 | 9 | ... | 1 | ... | 11 | ... | 42 | ... | 3 | ... | ... | ... | ... |
| 9 | 14 | ... | ... | ... | 7 | ... | 43 | ... | 3 | ... | ... | ... | 1 |
| 10 | 12 | ... | ... | ... | 10 | 1 | 44 | ... | 2 | ... | ... | ... | ... |
| 11 | ... | ... | ... | ... | ... | ... | 45 | ... | 6 | ... | ... | ... | 1 |
| 12 | 7 | ... | 1 | ... | 11 | 1 | 46 | ... | 10 | 1 | ... | ... | ... |
| 13 | 14 | ... | ... | ... | 5 | ... | 47 | ... | 4 | ... | 1 | ... | 1 |
| 14 | 23 | 1 | 3 | ... | 15 | ... | 48 | ... | 13 | ... | 2 | ... | 1 |
| 15 | 26 | ... | 1 | ... | 6 | ... | 49 | ... | 8 | ... | 1 | ... | 1 |
| 16 | 38 | ... | ... | ... | 13 | ... | 50 | ... | 11 | ... | 1 | ... | 2 |
| 17 | 9 | ... | ... | 1 | 5 | ... | 51 | ... | 7 | ... | 2 | ... | ... |
| 18 | 2 | ... | ... | ... | ... | ... | 52 | ... | 3 | ... | 2 | ... | 1 |
| 19 | 16 | 1 | 1 | ... | 3 | ... | 53 | ... | 1 | ... | 2 | ... | ... |
| 20 | 20 | ... | 1 | ... | 2 | 2 | 54 | ... | ... | ... | 1 | ... | ... |
| 21 | 28 | 7 | 4 | ... | 2 | 1 | 55 | ... | 1 | ... | ... | ... | ... |
| 22 | 12 | 3 | ... | 1 | 1 | ... | 56 | ... | 2 | ... | 2 | ... | ... |
| 23 | 7 | 1 | ... | ... | 2 | 1 | 57 | ... | 1 | ... | ... | ... | ... |
| 24 | 4 | ... | 1 | ... | 1 | ... | 58 | ... | 1 | ... | ... | ... | ... |
| 25 | 11 | 7 | 3 | ... | ... | ... | 59 | ... | ... | ... | ... | ... | ... |
| 26 | 5 | 4 | 1 | ... | 1 | ... | 60 | ... | ... | ... | ... | ... | ... |
| 27 | 8 | 2 | ... | ... | ... | 1 | 61 | ... | ... | ... | ... | ... | ... |
| 28 | 8 | 2 | ... | ... | 1 | ... | 62 | ... | ... | ... | ... | ... | ... |
| 29 | 4 | 5 | ... | ... | ... | 1 | 63 | ... | ... | ... | ... | ... | ... |
| 30 | 5 | 14 | ... | ... | ... | ... | 64 | ... | ... | ... | 1 | ... | ... |
| 31 | 2 | 9 | 2 | 1 | ... | ... | | | | | | | |
| 32 | 2 | 8 | ... | 2 | ... | 3 | | | | | | | |
| 33 | 4 | 5 | 1 | ... | ... | ... | TOTAL | 346 | 192 | 21 | 28 | 250 | 27 |

Proportion of Members who are Bachelors = 32·1 per cent.
" " Married = 62·2 "
" " Widowers = 5·7 "

The corresponding proportions at 1st January 1873, were (Chap. II.)—

Bachelors, 32·9 per cent.
Married, 62·3 "
Widowers, 4·8 "

Thus, it would appear that these proportions have varied but slightly in the five years.

TABLE B.—*Showing the classification, as at 31st March 1878, of the Existing Children of Existing Members (Active and Retired), according to Years of Service completed by the Father at birth of child, and according to ages of children last birthday.*

(1) DAUGHTERS (Unmarried) born in Father's Year of Service.

| Daughter's Age last Birthday. | 0 | | 5 | | 10 | | 15 | | 20 | | 25 | | 30 | | 35 | | 40 | 45 | TOTAL. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Active. | Retired. | Active. | Retired. | Active. | Retired. | Active. | Retired. | Active. | Retired. | Active. | Retired. | Active. | Retired. | Active. | Retired. | Retired. | Retired. | |
| 0 | ... | ... | 9 | ... | 4 | ... | 7 | ... | 5 | 1 | 3 | 1 | 2 | 2 | ... | ... | 1 | ... | 35 |
| 1 | 1 | ... | 7 | ... | 6 | ... | 6 | ... | 10 | 1 | 2 | ... | 1 | 1 | ... | ... | ... | ... | 35 |
| 2 | 1 | ... | 6 | ... | 6 | ... | 10 | ... | 5 | 4 | 2 | ... | ... | 3 | ... | 1 | ... | ... | 38 |
| 3 | 1 | ... | 11 | ... | 7 | ... | 11 | ... | 12 | 2 | 2 | 3 | ... | 1 | ... | ... | ... | ... | 50 |
| 4 | 3 | ... | 5 | ... | 17 | ... | 13 | 1 | 4 | ... | 3 | 2 | ... | 1 | ... | ... | ... | ... | 49 |
| 5 | 3 | .. | 3 | ... | 12 | ... | 11 | ... | 5 | 3 | 2 | 3 | ... | 1 | ... | ... | ... | ... | 43 |
| 6 | ... | ... | 7 | ... | 12 | ... | 11 | ... | 3 | 1 | 3 | 8 | ... | ... | ... | 1 | ... | 1 | 47 |
| 7 | ... | ... | 7 | ... | 10 | ... | 8 | ... | 4 | ... | 2 | 4 | ... | 2 | ... | 1 | ... | ... | 38 |
| 8 | ... | ... | 8 | ... | 7 | 1 | 8 | 3 | 2 | ... | 2 | 6 | ... | ... | ... | 1 | 2 | ... | 40 |
| 9 | ... | ... | 6 | ... | 9 | 1 | 7 | 1 | 3 | 3 | ... | 2 | ... | 1 | ... | ... | ... | ... | 33 |
| 10 | 1 | ... | 4 | 1 | 16 | ... | 7 | 1 | ... | 5 | ... | 7 | ... | 1 | ... | ... | ... | ... | 43 |
| 11 | 1 | ... | 10 | 1 | 9 | ... | 7 | ... | 3 | 3 | ... | 3 | ... | 2 | ... | ... | ... | ... | 39 |
| 12 | ... | ... | 7 | ... | 9 | ... | 3 | 1 | 1 | 4 | 1 | 1 | ... | ... | ... | 2 | ... | ... | 29 |
| 13 | 1 | ... | 10 | ... | 11 | 1 | 9 | 1 | ... | 6 | ... | 5 | ... | 1 | ... | 2 | 1 | 1 | 49 |
| 14 | 2 | ... | 4 | ... | 8 | 1 | 2 | ... | ... | 2 | ... | ... | ... | ... | ... | 1 | ... | ... | 20 |
| 15 | 5 | ... | 7 | 1 | 5 | 2 | 4 | 5 | 2 | 8 | ... | 1 | ... | ... | ... | 1 | 1 | ... | 42 |
| 16 | 1 | ... | 3 | ... | 7 | 1 | 1 | 6 | ... | 6 | ... | 1 | ... | 3 | ... | ... | ... | ... | 29 |
| 17 | 1 | ... | 8 | 1 | 5 | 1 | 1 | 3 | ... | 6 | ... | 1 | ... | 2 | ... | ... | ... | ... | 29 |
| 18 | 3 | ... | 4 | 2 | 10 | 2 | 1 | 5 | ... | 4 | ... | ... | ... | 2 | ... | 1 | ... | ... | 34 |
| 19 | 1 | ... | 5 | ... | ... | 4 | ... | 3 | ... | ... | ... | 2 | ... | 3 | ... | ... | ... | ... | 18 |
| 20 | ... | ... | 2 | ... | ... | 1 | 1 | 3 | ... | 2 | 1 | 2 | ... | 2 | ... | 1 | ... | ... | 15 |
| 21 | ... | ... | 4 | ... | 3 | 3 | ... | 4 | ... | 2 | ... | 2 | ... | 2 | ... | ... | . . | ... | 20 |
| 22 | 1 | ... | 1 | ... | 4 | 4 | ... | 4 | ... | 1 | ... | 2 | ... | 3 | ... | ... | ... | ... | 20 |
| 23 | ... | ... | ... | ... | ... | 3 | ... | 5 | ... | 1 | ... | 5 | ... | 1 | ... | ... | ... | ... | 15 |
| 24 | ... | ... | 3 | ... | 1 | ... | ... | ... | ... | 1 | ... | 7 | ... | 1 | ... | ... | ... | ... | 13 |
| 25 | ... | ... | ... | ... | ... | 2 | ... | 2 | ... | 3 | ... | 1 | ... | 1 | ... | ... | ... | ... | 9 |
| 26 | ... | ... | ... | 2 | ... | 2 | ... | 1 | ... | 1 | ... | 1 | ... | ... | ... | ... | ... | ... | 7 |
| 27 | ... | ... | 1 | 2 | ... | 1 | ... | ... | ... | 1 | ... | 3 | ... | ... | ... | ... | ... | ... | 8 |
| 28 | 1 | ... | ... | 1 | ... | 1 | ... | 1 | ... | 2 | ... | 1 | ... | ... | ... | ... | ... | ... | 7 |
| 29 | ... | ... | 1 | 1 | ... | ... | ... | 1 | ... | 2 | ... | 1 | ... | 1 | ... | ... | ... | ... | 7 |
| 30 | ... | ... | ... | 1 | ... | ... | ... | 1 | ... | 5 | ... | ... | ... | ... | ... | ... | ... | ... | 7 |
| 31 | ... | ... | ... | 1 | ... | 1 | ... | ... | ... | 4 | ... | 1 | ... | ... | ... | ... | ... | ... | 7 |
| 32 | ... | ... | ... | ... | ... | 2 | ... | ... | ... | 1 | ... | 1 | ... | ... | ... | ... | ... | ... | 4 |
| 33 | ... | ... | ... | ... | ... | ... | ... | 6 | ... | 1 | ... | ... | ... | ... | ... | ... | ... | ... | 7 |
| 34 | ... | ... | ... | ... | ... | 1 | ... | 2 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 3 |
| 35 | ... | ... | ... | 1 | ... | 1 | ... | ... | ... | 1 | ... | ... | ... | ... | ... | ... | ... | ... | 3 |
| 36 | ... | ... | ... | 1 | ... | 2 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 3 |
| 37 | ... | ... | ... | ... | ... | 1 | ... | 1 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 2 |
| 38 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 39 | ... | 1 | ... | ... | ... | ... | ... | ... | ... | 1 | ... | ... | ... | ... | ... | ... | ... | ... | 2 |
| 40 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 41 | ... | ... | ... | 2 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 2 |
| 42 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 43 | ... | ... | ... | ... | ... | 1 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 1 |
| 49 | .. | ... | ... | 1 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 1 |
| 53 | ... | ... | ... | 1 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 1 |
| 61 | ... | ... | ... | 1 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 1 |
| | 27 | 1 | 143 | 21 | 178 | 40 | 128 | 61 | 59 | 88 | 23 | 77 | 3 | 37 | ... | 12 | 5 | 2 | 905 |

TABLE B (continued).

(2) SONS born in Father's Year of Service.

| Son's Age last Birthday. | 0 | | 5 | | 10 | | 15 | | 20 | | 25 | | 30 | | 35 | | 40 | 45 | TOTAL. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Active. | Retired. | Active. | Retired. | Active. | Retired. | Active. | Retired. | Active. | Retired. | Active. | Retired. | Active. | Retired. | Active. | Retired. | Retired. | Retired. | |
| 0 | ... | ... | 6 | ... | 10 | ... | 13 | ... | 4 | ... | ... | ... | ... | ... | ... | 1 | ... | ... | 34 |
| 1 | 1 | ... | 6 | ... | 8 | ... | 13 | 1 | 8 | 1 | 2 | ... | ... | 2 | ... | 1 | ... | 1 | 44 |
| 2 | .. | ... | 7 | ... | 5 | ... | 10 | ... | 9 | ... | 1 | ... | 2 | 3 | ... | 1 | 1 | ... | 39 |
| 3 | 2 | ... | 5 | ... | 11 | ... | 13 | 1 | 7 | 2 | 1 | 1 | ... | 1 | ... | 1 | ... | 1 | 46 |
| 4 | 5 | ... | 5 | ... | 7 | ... | 14 | 1 | 4 | ... | 2 | 3 | ... | 2 | ... | ... | ... | .. | 43 |
| 5 | 3 | ... | 2 | ... | 16 | ... | 10 | ... | 4 | ... | 3 | 7 | 1 | 3 | ... | ... | ... | 2 | 51 |
| 6 | 1 | ... | 9 | ... | 10 | 1 | 9 | 3 | ... | 1 | ... | 5 | ... | 1 | ... | ... | ... | ... | 40 |
| 7 | ... | ... | 3 | 1 | 10 | ... | 9 | 3 | 4 | 5 | ... | 2 | ... | 2 | ... | ... | 1 | ... | 40 |
| 8 | 1 | ... | 10 | ... | 11 | ... | 7 | 2 | ... | 3 | 1 | 2 | ... | 2 | ... | ... | 1 | ... | 40 |
| 9 | 1 | ... | 14 | ... | 10 | 1 | 3 | 1 | 5 | 2 | 1 | 1 | ... | 2 | ... | ... | ... | ... | 41 |
| 10 | ... | ... | 6 | ... | 10 | 2 | 5 | 1 | 2 | 2 | ... | 4 | ... | ... | ... | ... | 1 | ... | 33 |
| 11 | ... | ... | 9 | ... | 13 | 1 | 4 | 2 | 2 | 4 | ... | 2 | ... | ... | ... | ... | 1 | ... | 38 |
| 12 | 1 | ... | 5 | 1 | 8 | .. | 5 | 3 | 2 | 3 | ... | 1 | ... | ... | ... | 2 | ... | ... | 31 |
| 13 | 3 | ... | 3 | .. | 6 | 2 | 4 | 3 | 3 | 3 | ... | 4 | ... | 1 | ... | 1 | ... | ... | 33 |
| 14 | 5 | ... | 8 | ... | 6 | 1 | 4 | 1 | 1 | 5 | ... | 1 | ... | 2 | ... | 2 | ... | ... | 36 |
| 15 | ... | ... | 2 | ... | 8 | 3 | 2 | 2 | 1 | 6 | ... | 2 | ... | 1 | ... | ... | ... | ... | 27 |
| 16 | ... | ... | 7 | 1 | 3 | 2 | 2 | 4 | ... | 6 | ... | 2 | ... | 1 | ... | 4 | 1 | ... | 33 |
| 17 | ... | ... | 3 | ... | 6 | 4 | 3 | 1 | ... | 2 | ... | 1 | 1 | 2 | ... | ... | ... | . | 23 |
| 18 | ... | ... | 5 | 1 | 2 | 1 | 3 | 1 | ... | 4 | ... | 1 | ... | 7 | ... | ... | 1 | .. | 26 |
| 19 | 1 | ... | 2 | 1 | 6 | ... | 3 | 7 | ... | 3 | ... | 2 | ... | 1 | ... | ... | ... | .. | 26 |
| 20 | 1 | ... | 1 | 3 | 2 | 2 | ... | 7 | ... | ... | ... | 1 | ... | 3 | ... | ... | ... | ... | 20 |
| | 25 | ... | 118 | 8 | 168 | 20 | 136 | 44 | 56 | 52 | 11 | 42 | 4 | 36 | ... | 13 | 7 | 4 | 744 |

These classifications A and B being completed, by the aid of the Tables in the Appendix, and using the same methods as for the Valuation as at 31st March 1873, the following Statements C and D were brought out, showing respectively the estimated values of the Benefits and Subscriptions as at 31st March 1878, and the Valuation Balance Sheet, as at the same date :—

## Statement C.—*Valuation of Benefits and Subscriptions as at 31 March 1878.*

| | Value of Benefits. | | | Value of Subscriptions in Rupees. | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | At 8 per cent. (Ordinary). | | | At 5 per cent. (Additional). | | |
| | At 8 per cent. | At 5 per cent. | | Active. | Retired. | Annuitants. | Active. | Retired. | Annuitants. |
| | £ | £ | | Rs. | Rs. | Rs. | Rs. | Rs. | Rs. |
| Incumbent Pensions—Old Rules:—to Widows | 70,211 | | Existing Married Members | 1,220,743 | 151,035 | 122,563 | ... | ... | ... |
| „ „ to Daughters | 25,219 | | Do. on account of present Wives | ... | ... | ... | 1,103,268 | 153,958 | 103,645 |
| | 95,430 | | Do. do. existing Daughters (including Widowers) | ... | ... | ... | 194,622 | 27,471 | 19,740 |
| Deduct first Quarter already paid | 3,538 | | Do. do. existing Sons (including Widowers) | ... | ... | ... | 82,984 | 7,299 | 5,046 |
| Total | 91,892 | | Do. do. on account of future Wives | ... | ... | ... | 86,616 | 31,761 | 8,341 |
| Incumbent Pensions—New Rules:—to Widows | 344,947 | 444,694 | Do. do. do. future Children | ... | ... | ... | 150,949 | 17,213 | |
| [Allowance for non-reduction of Pensions on re-marriage | 7,303 | 11,046] | Existing Bachelors & Widowers | 940,812 | 60,389 | 34,153 | ... | ... | ... |
| Do. do. to Daughters | 157,398 | 207,758 | Do. on account of future Wives | ... | ... | ... | 566,035 | 63,792 | 11,772 |
| Do. do. „ (Marriage Portion) | 14,985 | 18,019 | Do. do. future Children | ... | ... | ... | 151,343 | 17,747 | 2,851 |
| Do. do. to Sons | 45,589 | 50,909 | | | | | | | |
| Four Special Pensions | 3,366 | 4,501 | Total | 2,161,555 | 211,424 | 156,716 | 2,335,817 | 319,241 | 151,395 |
| Total | 566,285 | 725,881 | | | | | | | |
| Contingent Benefits:—to present Wives of existing Members | 361,053 | 593,774 | Value of Government Donation at $\frac{24,074}{864}$ Rs. per Member | ... | 219,210 | | | | |
| [Allowance for non-reduction of Pensions on re-marriage | 15,296 | 28,303] | | | | | | | |
| Do. to existing Daughters of existing married Members | 202,887 | 330,540 | (Taken at same value as in 1873.) | | | | | | |
| Do. do. Sons do. | 53,617 | 68,378 | | | | | | | |
| Total | 617,557 | 992,692 | | | | | | | |
| Potential Benefits:—on account of future Wives of existing Bachelors and Widowers | 87,142 | 189,404 | | | | | | | |
| [Allowance for non-reduction of Pensions on re-marriage | 5,950 | 12,888] | | | | | | | |
| Do. do. on account of future Children of existing Bachelors and Widowers | 63,352 | 138,360 | | | | | | | |
| Do. do. on account of future Children of existing married Members | 62,206 | 118,463 | | | | | | | |
| Do. do. on account of future Wives of existing married Members | 29,223 | 61,874 | | | | | | | |
| [Allowance for non-reduction of Pensions on re-marriage | 879 | 2,168] | | | | | | | |
| Total | 241,923 | 508,101 | | | | | | | |

## STATEMENT D.—*Valuation Balance Sheet as at 31st March 1878.*

| | | | Ordinary Branch. | | Additional Branch. | | |
|---|---|---|---|---|---|---|---|
| | | | | Undistributed. | Distributed. | | Undistributed. | Distributed. |
| | **LIABILITIES.** | | £ | £ | £ | £ | £ | £ |
| A | Old Rule Pensions | | 95,436 | | | | | |
| | Deduct for first Quarter, already paid | | 3,538 | | | | | |
| | | | | 91,892 | | | | |
| B | New Rule Pensions—Incumbent | | 566,285 | ... | ... | 725,881 | | |
| | Contingent, actual | | 617,557 | ... | ... | 992,692 | | |
| | Contingent, potential | | 241,923 | ... | ... | 508,101 | | |
| | Addition for Sons | | | | | | | |
| | Total | | 1,425,765 | ... | ... | 2,226,674 | | |
| C | Deduct value of one-sixth deduction | | | | | | | |
| D | Total value in Pounds sterling in England | | ... | 91,892 | 1,425,765 | ... | ... | 2,226,674 |
| | | | Rs. | Rs. | Rs. | Rs. | Rs. | Rs. |
| E | *Converted into Rupees in India* | | 9·75034=£1 | 895,783 | 13,901,694 | 10·0199=£1 | ... | 22,311,050 |
| F | *Add loss in exchange by using Subscriptions (same as in 1873)* | | ... | 6,502 | ... | ... | 1,000 | |
| G | *Cost of Establishment, &c.* | | ... | ... | 113,326 | ... | ... | 151,878 |
| H | *Amount due for adjustment with Government:—* | | | | | | | |
| | | Amount of Bill. Due Date. | | | | | | |
| | Old Rules | Rs. 75,000+4 per cent. 2 July 1878 | 76,470 | | | | | |
| | | 50,000+4 „ 31 Dec. 1878 | 49,060 | | | | | |
| | | | | 125,530 | | | | |
| K | New Rules | Rs. 145,000+4 „ 1 April 1878 | 150,800 | ... | ... | 150,800 | | |
| | | 155,000+4 „ 2 July 1878 | 158,038 | ... | ... | 159,209 | | |
| | | 145,000+4 „ 2 Oct. 1878 | 145,000 | ... | ... | 147,121 | | |
| | | 160,000+4 „ 31 Dec. 1878 | 156,992 | ... | ... | 160,385 | | |
| | | 160,000+4 „ 1 April 1879 | *Omitted.* | ... | 610,830 | *Omitted.* | ... | 617,515 |
| | Total Liabilities in Rupees in India | | | 1,027,815 | 14,625,850 | ... | 1,000 | 23,080,443 |
| | **ASSETS.** | | | | | | | |
| L | *Realized as by Accounts* | | ... | 9,208,297 | ... | ... | 5,474,261 | |
| M | *Interest due, but not realized, Rs. 312,905, less ¼ per cent.* | | ... | 311,340 | | | | |
| N | Future Subscriptions, by new tables:— | | | | | | | |
| | By present Members, during active service | | 2,161,555 | ... | ... | 2,335,817 | | |
| | By present Members, after retirement | | 211,424 | ... | ... | 319,241 | | |
| | By present Annuitants | | 156,716 | ... | ... | 151,395 | | |
| | | | | 2,529,695 | | | 2,806,453 | |
| O | Add amount due on 1st April | | | | | | | |
| P | Minimum payments, *i.e.*, to make up balance to | | | | | | | |
| Q | Government donation of £2,500 per annum (same as in 1873) | | ... | 219,210 | | | | |
| R | Fines | | | | | | | |
| | Total Assets in Rupees in India | | ... | 12,268,542 | ... | ... | 8,280,714 | |

NOTE.—The items in italics are taken from the Fund Valuation (see Chapter XI.).

Before dealing with the latter, it will be useful to compare the various items in C with the corresponding items of the Fund Valuation at the same date—

(1).—*Incumbent Pensions—Old Rules.*

The values of the pensions to widows are, as they should be, practically the same, being £70,211, as against £70,364; the small discrepancy arises from two clerical errors in the Fund Valuation.

The values of the pensions to daughters are £25,219, as against £24,319, the difference arising from a somewhat lower rate of marriage being assumed in Table III. (Appendix), than in the Table used in the Fund Valuation.

(2)—*Incumbent Pensions—New Rules.*

| | At 8 per cent. | At 5 per cent. |
|---|---|---|
| The values of the pensions to widows are, by Table VIII. (Appendix) . . . . . | £344,947 | £444,694 |
| As against, in the Fund Valuation . . . . | 340,216 | 437,242 |
| Difference—Present Valuation, in excess | £4,731 | £7,452 |

This difference arises from the same cause as in (1), viz. :—that in Table VIII. (Appendix), a somewhat lower rate of marriage is assumed than in the tables used in the Fund Valuation.

| | At 8 per cent. | At 5 per cent. |
|---|---|---|
| The values of the pensions to unmarried daughters are, by Table III. (Appendix) . . . . | £157,398 | £207,758 |
| As against, in the Fund Valuation . . . . | 153,451 | 201,115 |
| Difference—Present Valuation, in excess | £3,947 | £6,643 |

This difference arises from much the same cause as for widows, with the addition that the rate of mortality used is different at the early ages, being that deduced from the Fund's Experience, 1850–1872.

| | At 8 per cent. | At 5 per cent. |
|---|---|---|
| The values of the corresponding marriage donations are by Table IV. (Appendix) . . . . | £14,985 | £18,019 |
| As against, in the Fund Valuation . . . . | 15,102 | 18,432 |
| Difference—Present Valuation, in deficiency | £117 | £413 |

This difference arises from the same causes as in previous item.

| | At 8 per cent. | At 5 per cent. |
|---|---|---|
| The values of the pensions to sons under 21 are by Table II. (Appendix) . . . . . | £45,589 | £50,909 |
| As against, in the Fund Valuation . . . . . | 45,049 | 50,243 |
| Difference—Present Valuation, in excess | £545 | £666 |

This difference arises from the rate of mortality used in the present Valuation being deduced from the Fund's Experience, 1850–1872, and it is satisfactory to find the agreement between the two results so close.

The values of the four special pensions are taken at the figures given in the Fund Valuation :—

| | At 8 per cent. | At 5 per cent. |
|---|---|---|
| The total results for incumbent pensions (New Rules) are in present valuation . . . . . | £566,285 | £725,881 |
| As against in Fund Valuation . . . . . | 557,182 | 711,534 |
| Difference—Present Valuation, in excess | £9,103 | £14,347 |

(3).—*Contingent Benefits.*

| | At 8 per cent. | At 5 per cent. |
|---|---|---|
| The values of the contingent benefits to present wives of existing Members are in present valuation by Table VI. (A) Appendix . . . . . | £361,053 | £593,774 |
| As against in Fund Valuation . . . . . | 382,994 | 628,889 |
| Difference—Present Valuation, in deficiency | £21,941 | £25,115 |

This difference arises mainly from the rate of mortality deduced from the Fund's Experience, 1850-72, and used in Table VI. (A) Appendix, being much less for the earlier period of membership than the rate of mortality used in the Table XVII. (A), constructed by Mr. Brown, and from which the values used in the Fund Valuation have been computed. (See Chapter III.) Another cause of difference is that the number of wives is taken to be 538, as against 541 in Fund Valuation.

| | At 8 per cent. | At 5 per cent. |
|---|---|---|
| The values of the contingent benefits to existing daughters of existing Members are in the present valuation by Table X. (Appendix) . . . | £202,887 | £330,540 |
| As against in Fund Valuation . . . . . | 181,381 | 297,712 |
| Difference—Present Valuation, in excess | £21,506 | £32,828 |

Although in the Fund Valuation the number of daughters is taken at 910, as against 905 in the present Valuation, it will be seen that there is a considerable difference in the values brought out in the two Valuations. This difference arises partly from the rates of mortality and marriage used in Table X. (Appendix), and which have been deduced from the Experience of the Fund, 1850–1872, differing from those used in the Fund Valuation, and partly from the assumption made by Mr. Brown, and adopted in the Fund Valuation, that the children are, on the average, born when the father is 35 years old, having been discarded. The reason for discarding this assumption, and for constructing valuation tables more properly applicable to the conditions of the Fund, is obvious, and need not be expatiated upon.

| | At 8 per cent. | At 5 per cent. |
|---|---|---|
| The values of the contingent benefits to existing sons of existing Members are, in the present Valuation, by Table IX. (Appendix) . . . . . | £53,617 | £68,378 |
| As against, in Fund Valuation . . . . . | 51,960 | 66,255 |
| Difference—Present Valuation, in excess | £1,657 | £2,123 |

The same remarks apply here, *mutatis mutandis*, as have been just made for daughters.

| | At 8 per cent. | At 5 per cent. |
|---|---|---|
| The total results for values of contingent benefits are, in present Valuation . . . . . | £617,557 | £992,692 |
| As against, in Fund Valuation . . . . . | 616,336 | 992,856 |
| Difference—Present Valuation, in excess | 221 | In deficiency 164 |

Although the total value of contingent benefits in the present Valuation agrees very closely with that of the Fund Valuation, it will be seen from the above comparison that in the various items of which it is composed there is, in some cases, a considerable difference. These differences may be, speaking generally, accounted for by the difference in the rates of mortality in the early years of membership, as deduced from the Fund's Experience, 1850–1872, and employed in the present Valuation, from those used by Mr. Brown in the construction of the tables used in the Fund Valuation, and by discarding in the present Valuation the assumption made in the Fund Valuation as to the difference in age of the father and his children.

As in the 1873 Valuation, no allowance has been made for widows' pensions reverting back to the full amount on death of second husband.

### (4)—*Potential Benefits.*

| | At 8 per cent. | At 5 per cent. |
|---|---|---|
| The values of the benefits to future wives of existing bachelors and widowers, are, in the present Valuation, by Table V. (Appendix) . . . . . | £87,142 | £189,404 |
| As against, in Fund Valuation . . . . . | 76,998 | 155,030 |
| Difference—Present Valuation, in excess | £10,144 | £34,374 |

The number of bachelors and widowers is in present Valuation 326, as against 323 in Fund Valuation. As the rates of mortality and marriage used in Table V. (Appendix), are respectively considerably lower, and somewhat higher, than those given by Mr. Brown, and used in the Fund Valuations, this in itself would have the effect of anticipating a larger number of bachelors and widowers to marry than is anticipated in the Fund Valuation. On the other hand, the higher rate of mortality used in the Fund Valuation, would have the effect of over-estimating, as compared with the present Valuation, the value at time of marriage of the wife's contingent benefit. Against this, however, it is to be borne in mind, that in the present Valuation by Table V. (Appendix), the value of the liability is estimated not only on account of the first future wife, but all future wives.

| | At 8 per cent. | At 5 per cent. |
|---|---|---|
| The values of the benefits to future children of existing bachelors and widowers, are in the present Valuation by Table XI. (Appendix) . . | £63,352 | £138,360 |
| As against, in Fund Valuation . . . . . | 48,843 | 103,077 |
| Difference—Present Valuation, in excess | £14,509 | £35,283 |

The method of construction of Table XI. (Appendix), is set forth in Chapter VIII., and, it need only be added, that in the computation of this Table very great labour and care were exercised in taking out the facts upon which the assumption made in its construction is based; and the method adopted will, it is believed, be found to fairly represent, with a not unreasonable tendency to the safe side, the value that should be put upon this item.

| | At 8 per cent. | At 5 per cent. |
|---|---|---|
| The values of the benefits to future children of existing married Members, are, in the present Valuation (Chapter XI.) . . . . . | £62,206 | £118,468 |
| As against, in Fund Valuation . . . . . | 21,181 | 41,826 |
| Difference—Present Valuation, in excess | £41,025 | £76,637 |

It is in this item that the largest difference exists between the present Valuation and the Fund Valuation, and, looking to all the circumstances of the case, it is clearly an item as to which estimates may be expected, more or less, to differ.

It should, however, be remembered, that the above difference represents more than the actual difference between the two estimates, inasmuch as the Fund Valuation does not include the value of the contingent benefits to future children of future wives, but only of the present wives. Were this additional value brought into account, the difference would probably be considerably reduced. At the same time, although the difference would still be considerable, it is believed that the estimate put on this item in the present Valuation is not excessive, as every care was taken (*see* Chapter VIII.) to base such estimate, as far as possible, on the indications given by the Experience of the Fund.

| | At 8 per cent | At 5 per cent. |
|---|---|---|
| The values of the benefits to future wives of existing married Members are, in the present Valuation, (*see* Chapter III), by the use of Tables VI. (A) and VI. (B) Appendix . . . . . | £29,223 | £61,874 |
| As against, in Fund Valuation . . . . . | 25,523 | 52,916 |
| Difference—Present Valuation, in excess . | £3,700 | £8,958 |

As already pointed out in dealing with the previous item, the Fund Valuation estimate is not correctly given here, because it includes the provision for future children born of future wives of existing married Members, so that if this latter item were not included, the difference between the estimate in present Valuation and that in the Fund Valuation would be greater than is brought out above.

There is no doubt that the whole question of re-marriages of widowers is a difficult one to deal with, and cannot, at present at all events, be dealt with actuarially in the same exact manner as some other items. As shown, however, in Chapter III., it is certain that the question has a most important bearing upon the financial position of the Fund. The rate of mortality among Members' wives would appear to be at the younger ages considerably in excess of that among the Members (*see* Chapter III.), and the rate of re-marriage of Members is undoubtedly very high indeed, as is seen from the tables in Chapter III., showing the experience of the Fund 1850-72. Under these circumstances, it has been considered on the whole expedient so to treat this item as to leave no room for doubt as to the sufficiency of the provision made, and accordingly Table VI. (B) of the Appendix has been constructed in the manner indicated in Chapter III., the effect being to assume that a married Member will, up to the completion of 40 years from entry into the Service, always have a wife, and will always be paying the Additional Subscription for a wife.

| | At 8 per cent. | At 5 per cent. |
|---|---|---|
| The values in present Valuation of contingent benefits for present wives are . . . . . | £361,053 | £593,774 |
| And the values for the same benefits to future wives are . . . . . | 29,223 | 61,874 |

The latter values will be seen to be about $8\frac{1}{10}$ per cent. and $10\frac{1}{2}$ per cent. respectively of the former.

| | At 8 per cent. | At 5 per cent. |
|---|---|---|
| The total results for values of potential benefits are, in present Valuation . . . . . | £241,923 | £508,101 |
| As against, in Fund Valuation . . . . . | 172,545 | 352,850 |
| Difference—Present Valuation, in excess | £69,378 | £155,251 |

The present Valuation accordingly estimates the values of the potential benefits at about 40 per cent. and 44 per cent. respectively in excess of the values put upon them in the Fund Valuation.

If we compare the values of the potential benefits in the two valuations for bachelors and widowers and married Members respectively, we have the following results :—

*Bachelors and Widowers : Potential Benefits.*

| | Present Valuation. | | | Fund Valuation. | |
|---|---|---|---|---|---|
| | At 8 per cent. | At 5 per cent. | | At 8 per cent. | At 5 per cent. |
| For wives . | £87,142 | £189,404 | ... | £76,998 | £155,030 |
| For children . | 63,352 | 138,360 | ... | 48,843 | 103,077 |
| | 150,494 | 327,764 | | £125,841 | £258,107 |
| | 125,841 | 258,107 | | | |
| | £24,653 | £69,657 | | | |

The excess of present Valuation estimates over those of the Fund Valuation is about 19½ per cent. at 8 per cent., and 27 per cent. at 5 per cent.

*Married Members : Potential Benefits.*

| | Present Valuation. | | | Fund Valuation. | |
|---|---|---|---|---|---|
| | At 8 per cent. | At 5 per cent. | | At 8 per cent. | At 5 per cent. |
| For future wives . | £29,223 | £61,874 | ... | £25,523 | £52,916 |
| For future children . | 62,206 | 118,463 | ... | 21,181 | 41,826 |
| | 91,429 | 180,337 | ... | £46,704 | £94,742 |
| | 46,704 | 94,742 | | | |
| | £44,725 | £85,595 | | | |

The excess of present Valuation estimates, over those of the Fund Valuation, will be seen to be about 96 per cent. and 90 per cent. respectively.

As regards bachelors and widowers, it may be that hereafter the rate of marriage used in Table V. will not correctly represent the experience, although it is believed that in the long run, under the existing conditions of the Fund, this will not prove to be the case. For the same reason it may hereafter result, that the future children to be born to existing Members, as based on their present duration of membership, would not be correctly represented by the Tables on pages 50 and 51 of Chapter VIII.

The reserve for future wives of existing Members is undoubtedly somewhat in excess of that which would be exactly required, but the excess can only be comparatively small, and it will be wise, under the circumstances, not to attempt to estimate it more exactly.

Coming now to the values of the ordinary and Additional subscriptions, a comparison of the value of the ordinary subscriptions for quinquennial ages used in the Fund Valuation with the values given in Table I. (A) of the Appendix to the present Report, shows on the whole a tolerably close agreement.

Thus, taking ages 20–25 as about the same thing as year 0 of Membership, we have—

| Fund Estimate. | | | | In Present Valuation. | | | |
|---|---|---|---|---|---|---|---|
| Ages. | Active. | Retired. | Total. | Years from Entry. | Active. | Retired. | Total. |
| | Rs. | Rs. | Rs. | | Rs. | Rs. | Rs. |
| 20–25 | 2,550 | 63 | 2,613 | 0 | 2,763 | 85 | 2,848 |
| 25–30 | 3,368 | 101 | 3,469 | 5 | 3,397 | 132 | 3,529 |
| 30–35 | 4,072 | 164 | 4,236 | 10 | 4,021 | 207 | 4,228 |
| 35–40 | 4,476 | 265 | 4,741 | 15 | 4,438 | 328 | 4,766 |
| 40–45 | 4,230 | 432 | 4,662 | 20 | 3,896 | 520 | 4,416 |
| 45–50 | 2,337 | 706 | 3,043 | 25 | 2,189 | 820 | 3,009 |
| 50–55 | 885 | 951 | 1,836 | 30 | 793 | 989 | 1,782 |
| 55–60 | ... | 976 | 976 | 35 | 173 | 990 | 1,163 |

The low estimate of the Fund Valuation at entry, and just after, may be in great measure, accounted for by the over-estimate of the rate of mortality arising from the use of Mr. Brown's Table 17 (A).

At 10 and 15 years from entry, the two estimates are practically identical.

At 20 years from entry there is a difference of some 5 per cent.

At 25 and 30 years from entry the two estimates differ by less than 2 per cent.

At 35 years from entry there is a considerable difference arising from the rough method of approximation for the effect of retirements made in the Fund Valuation estimates.

On the whole the agreement is certainly as close as could be reasonably expected, and shows that the values used in the Fund Valuation are substantially correct, as far as can be judged from the past experience of the Fund.

Comparing now the results of the present Valuation of the ordinary subscriptions and the Fund Valuation, we have—

Value of Ordinary Subscriptions.

| | Active. | Retired. | Annuitants. | Total. |
|---|---|---|---|---|
| | Rs. | Rs. | Rs. | |
| Fund Valuation . | 2,225,135 | 170,062 | 136,641 | 2,531,838 |
| Present „ . | 2,161,555 | 211,424 | 156,716 | 2,529,695 |
| | (+)63,580 | (−)41,362 | (−)20,075 | (+)2,143 |

It will be seen that the totals differ by only 2,143 Rs. This result cannot but be considered satisfactory, although when we proceed to analyze the three items, the differences are much more considerable. Roughly speaking, the differences may be thus explained:—

The rates of mortality and retirement upon which the Fund's estimate is based, differ considerably from those brought out in the present Report, and it is thus not at all unlikely that the two estimates would differ somewhat from one another. In addition, in the present Valuation, the value of the annuitants' subscriptions has had to be approximated to by assuming that they would all pay half rates on pensions of £1000 a-year, and that 30 per cent. of the annuitants, or $\frac{248-174}{248}$, had compounded for their future subscriptions. The distribution, according to years from entry of the annuitants who had compounded, could not be made, as there was no information on the point.

The additional subscriptions, as valued in the Fund Valuation, and the present Valuation, are as follows:—

VALUE OF ADDITIONAL SUBSCRIPTIONS.

| | Active. Rs. | Retired. Rs. | Annuitants. Rs. | TOTAL. |
|---|---|---|---|---|
| Fund Valuation ... | 2,473,224 | 251,144 | 119,049 | 2,843,417 |
| Present „ ... | 2,335,817 | 319,241 | 151,395 | 2,806,453 |
| | (+) 137,407 | (−) 68,097 | (−) 32,346 | (+) 36,964 |

Considering the dissimilarity in the methods by which these two sets of results have been obtained, the agreement is undoubtedly as close, if not closer, than could have been expected. On the final results there is about 1½ per cent. difference; and, assuming the tables given in the Appendix to this Report to fairly represent the value of the additional subscriptions payable, it cannot but be considered satisfactory to find how nearly, on the whole, the Fund Valuations have approximated thereto, although some at least of the data on which these approximations have been based, are, judging from the Experience of the Fund, undoubtedly incorrect.

It should be noted, as in the case of the ordinary subscriptions, that, as there was no means of telling which of the annuitants had compounded, an approximation was made in the present Valuation to the value of the future subscriptions payable, by assuming that 30 per cent. of the annuitants had compounded.

It will be noticed that the Valuation of the liabilities has been made at 8 per cent. and 5 per cent. interest respectively. Attention has, however, been prominently drawn to the fact that the interest allowed on the assets of the Fund is payable half-yearly, and this fact has been specially allowed for in the Fund Valuations as at 31st March 1873 and 31st March 1878, as regards the 8 per cent. rate of interest in the Ordinary branch.

In order to ascertain precisely the financial effect of the 8 per cent. interest on the ordinary fund being payable half-yearly, and thus converting the nominal yearly rate of 8 per cent. into an effective rate of 8·16 per cent., the annuity values for Members for both rates of interest are given for quinquennial years from entry in the following table, as are also given the corresponding values for sums payable at death:—

| Years from Entry. | Curtate Annuity Values. | | Value of £1 Payable at Death. | |
|---|---|---|---|---|
| | Interest at 8 per cent. | Interest at 8·16 per cent. | Interest at 8 per cent | Interest at 8·16 per cent |
| 0 | 10·47 | 10·30 | ·1504 | ·1472 |
| 5 | 10·25 | 10·09 | ·1667 | ·1631 |
| 10 | 10·02 | 9·87 | ·1837 | ·1800 |
| 15 | 9·77 | 9·63 | ·2022 | ·1979 |
| 20 | 9·44 | 9·31 | ·2267 | ·2221 |
| 25 | 8·96 | 8·84 | ·2622 | ·2575 |
| 30 | 8·36 | 8·26 | ·3067 | ·3012 |
| 35 | 7·66 | 7·57 | ·3585 | ·3531 |
| 40 | 6·81 | 6·75 | ·4215 | ·4155 |
| 45 | 5·81 | 5·76 | ·4956 | ·4899 |
| 50 | 4·58 | 4·55 | ·5867 | ·5814 |
| 55 | 3·22 | 3·21 | ·6874 | ·6825 |
| 60 | 1·86 | 1·86 | ·7882 | ·7842 |

The differences between the values of £1 payable at death of a Member will be seen to vary from about 2 per cent. at the earlier years of membership to about ½ per cent. at the older years of membership. This, however, does not represent the full effect of using the higher rate of interest in the Valuation, because it assumes that when a Member dies the amount of the liability is the same, whereas the value of the liability brought upon the Fund at death has also to be calculated at the rates of interest 8 per cent. and 8·16 per cent. respectively; so that in using the higher rate of interest, the value of the liability *when brought upon the Fund* is also less than the corresponding value at the lower rate of interest.

To test the difference in the extreme case arising from the use of the two rates of interest, let us assume that in every case of a Member dying the liability brought upon the Fund is a perpetuity, so that the value of the claim when brought upon the Fund estimated at 8 per cent. would be the value of a perpetuity at 8 per cent., which is $\frac{1}{\cdot 08}$ or 12·5, the annuity payable being 1 per annum, and at 8·16 per cent. would be $\frac{1}{\cdot 0816}$ or 12·255, or 1·96 per cent. less than at 8 per cent.

The following table gives a comparison of the present values of the said perpetuities according to present years of membership of the Member at whose death the perpetuity becomes payable, at 8 per cent. and 8·16 per cent. respectively.

| Years completed from Entry. | Present Value of Perpetuity to become payable at Death. | | |
|---|---|---|---|
| | At 8 per cent. | At 8·16 per cent. | |
| 0 | 1·879 | 1·804 | or about 4· per cent. less than at 8 per cent. |
| 5 | 2·083 | 1·999 | „ 4· „ „ |
| 10 | 2·296 | 2·205 | „ 4· „ „ |
| 15 | 2·528 | 2·425 | „ 4· „ „ |
| 20 | 2·833 | 2·722 | „ 3·9 „ „ |
| 25 | 3·278 | 3·155 | „ 3·7 „ „ |
| 30 | 3·833 | 3·698 | „ 3·5 „ „ |
| 35 | 4·481 | 4·328 | „ 3·4 „ „ |
| 40 | 5·269 | 5·092 | „ 3·3 „ „ |
| 45 | 6·194 | 6·004 | „ 3·1 „ „ |
| 50 | 7·333 | 7·125 | „ 2·8 „ „ |
| 55 | 8·593 | 8·364 | „ 2·7 „ „ |
| 60 | 9·852 | 9·600 | „ 2·6 „ „ |

The above results, of course, represent the extreme case—a case which would not occur in the Fund. If, instead of assuming a perpetuity to be payable on the death of a Member, we take the maximum claim which could occur, say a pension worth 10 years' purchase at 8 per cent., and at 8·16 per cent. worth say 1½ per cent. less, or 9·85 years' purchase, then the present value of such a benefit would be as follows :—

| Years completed from Entry. | Present Value of Pension to become payable at Death. | | |
|---|---|---|---|
| | At 8 per cent. | At 8·16 per cent. | |
| 0 | 1·504 | 1·448 | or about 3·7 per cent. less than at 8 per cent. |
| 10 | 1·837 | 1·773 | „ 3·5 „ „ |
| 20 | 2·267 | 2·187 | „ 3·5 „ „ |
| 30 | 3·067 | 2·965 | „ 3·3 „ „ |
| 40 | 4·215 | 4·097 | „ 2·8 „ „ |
| 50 | 5·867 | 5·723 | „ 2·5 „ „ |
| 60 | 7·882 | 7·722 | „ 2·0 „ „ |

This, again, is an outside estimate of the effect of using 8·16 per cent. as the rate of interest, instead of 8 per cent. On the whole, if we took, say 2½ per cent. to represent the actual difference between an estimate of the value of the Contingent Liabilities of all kinds, possibly such estimate would not be wide of the mark. It, must, however, be remembered that 2½ per cent. does not apply as the measure of the difference between the values of the Incumbent Liabilities, at 8 per cent. and 8·16 per cent. respectively. In the extreme case of a perpetuity, the difference is only 1·96 per cent., and a reference to the tables just given will show that for life annuities the difference must be considerably less. Without going further into detail, it may be stated generally that 1¼ per cent. would appear to give a fair value to the difference between the values of the incumbent pensions (New Rules), at 8 per cent. and at 8·16 per cent. respectively.

Now we find in Statement D that the value of the contingent liabilities (actual and potential), at 8 per cent., is £859,480, and the value of the incumbent pensions (New Rules) £566,285, and

| | | | | |
|---|---|---|---|---|
| 2½ | per cent. on | £859,480 | = | £21,487 |
| 1½ | „ „ | 566,285 | = | 7,078 |
| 2 | „ „ | £1,425,765 | = | £28,565 |

Thus, the allowance to be made on the value of all the New Rule liabilities, on account of interest at 8 per cent. per annum being payable half-yearly instead of yearly, is brought out to be, as near as possible, 2 per cent.

As regards the Old Rule Pensions, a deduction of 1 per cent. will certainly be an ample allowance, as they were only worth, at the date of Valuation, somewhat less than seven years' purchase.

An all round deduction of 3 per cent. is stated to have been made in the last two Fund Valuations, but the above reasoning will serve to show that this deduction, which appears to have been made without full consideration of the various points involved, is in excess of what may be considered a fair estimate. As far as this item goes, therefore, the 8 per cent. Fund has been for some years past overcharged.

There appear, however, to be grave doubts as to whether any deduction from the value of the liabilities, as estimated at 8 per cent., should be made on account of the interest at 8 per cent. per annum being paid half-yearly instead of yearly. As far as can be judged from the information furnished in the "Examination," the concession of 8 per cent. interest did not go beyond an undertaking to make up the rate of interest yielded by the accumulated (ordinary) contributions to 8 per cent. per annum, and payment of interest half-yearly at that nominal rate, would seem to be a privilege which might be withdrawn at any time. Possibly there exists evidence to show that the additional privilege of receiving interest half-yearly was granted, but in the absence of such evidence, the expediency of dividing any surplus brought out on the assumption that the 8 per cent. interest would always be payable half-yearly would seem to be at least doubtful.

It is evident, however, that if any allowance is to be made, it should be made not only on the present value of the liabilities as estimated at 8 per cent., but also on the present value of the future subscriptions; and a deduction of 1½ per cent. will be seen, on reference to the annuity values as at 8 per cent. and 8·16 per cent., to be a fair allowance to make.

Having thus dealt with the various points arising in connection with the valuation of the liabilities and subscriptions, it remains to apply the various adjustments in connection with the results given in Statement D.

As in the 1873 Valuation, the item C is not brought into account, for the reason stated in Chapter IX.

No allowance has been made for the Rule allowing sons to receive payment of their pensions in full before attaining the age of 21. The amount must necessarily be small, and Mr. Brown's suggestion—that the capitalized values only should be paid—appears to be one which should be adopted.

The item O is considered to be included in the item N; and the items P and R have not been brought into account (*see* Chapter IX.)

The regulation in item E is taken from the Fund Valuation, and no opinion is here expressed upon it; and the same remark applies to F, G, H, K, L, M.

Neglecting, in the first instance, the adjustments which may be used on account of the 8 per cent. interest being payable half-yearly, and using the notation of the Fund Valuations, we have the following results in rupees:

Ordinary Branch: Liabilities, $1,027,815 + 14,625,850m$.
Assets, 12,268,542.

From which, it appears that the proportion of the liabilities, as at date of Valuation, which the Ordinary Branch could provide, is given by—

$$m = \frac{11,240,727}{14,625,850} = \cdot 76855.$$

Additional Branch: Liabilities, $1000 + 23,080,443\,(1-m)$.
Assets, 8,280,714.

Putting $1 - m = \cdot 23145$, gives the value of the liabilities which are required to be met by the Additional Branch to be 5,341,968; and the assets of this branch, after deducting the Fund estimate of 1000 rupees, "loss in Exchange by using Subscriptions," being 8,279,714, there appears to be a surplus in this branch of 2,937,746 rupees.

If we apply the adjustments indicated above as representing the financial effect of interest on the assets of the Ordinary Branch being payable half-yearly, we have the following results:—

| | |
|---|---|
| Value of New Rule Liabilities . . . | Rs. 13,901,694 |
| Deduct 2 per cent. . . . | 278,034 |
| | 13,623,660 |
| Value of Old Rule Pensions . . . | 895,783 |
| Deduct 1 per cent. . . . | 8,958 |
| | 886,825 |
| Value of Ordinary Subscriptions . . | 2,529,695 |
| Deduct 1¼ per cent. . . . | 31,621 |
| | Rs. 2,498,074 |

ORDINARY BRANCH—Liabilities $(1,027,815 - 8,958) + (14,625,850 - 278,034)\ m.$
Assets . $(12,268,542 - 31,621)$

That is—Liabilities $1,018,857 + 14,347,816\ m.$
Assets . 12,236,921

This gives for the proportion of liabilities, which the Ordinary Branch could provide, $m = \cdot 78187$.

ADDITIONAL BRANCH—Liabilities . $1000 + 23,080,443\ (1 - m)$
Assets . . 8,280,714

Putting $1 - m = \cdot 21813$, gives as the value of the liabilities required to be met by the Additional Branch, 5,034,537 rupees, and the assets of this Branch being 8,279,714, there would appear to be a surplus in this Branch of 3,245,177 rupees.

The adjustment for the interest on the Additional Fund being payable half-yearly, would necessarily be so small that it has not been thought worth while to attempt to make any estimate of its amount.

The Fund Valuation brought out a surplus of 5,332,769 rupees in the Additional Branch, showing a difference from the surplus above brought out of nearly the same amount as at the previous valuation in 1873. The cause of this difference, after allowing for the fact that in the Valuation made in this Report (Chapter IX.) as at 31st March 1873, no allowance was attempted to be made for half-yearly payments of interest in the Ordinary Branch, may be at once seen to arise mainly from two causes:—

*Firstly*—In the present Valuation, for the reasons indicated in Chapter IX., no allowance has been made for one-sixth deductions in the event of premature death.

*Secondly*—The value put upon the potential benefits is much above that put upon them in the Fund Valuation, in which Mr. Brown's tables have been used (*see* Chapter VIII.).

The reserves brought out by the tables in the Appendix are, it is believed, quite ample for security, and accordingly it is advised that the surplus of 2,937,746 rupees in the Additional Branch (or, of 3,245,177 rupees, if the Fund can rely upon half-yearly payments of accrued interest on the 8 per cent. Branch), and which exists after making the assumption that the rule as to one-sixth deductions will be rescinded, be appropriated. It will, however, be understood that this Report does not profess to deal with the Government claim, the reason for this being mainly that, beyond Mr. Westland's "Examination," none of the papers relating to it, and alluded to in the Reference, have been available, having been lost or mislaid before the matter came into my hands.

It will also be borne in mind that, throughout this Report, it has been assumed that the Ordinary Branch, to which the 2½ per cent. subscriptions are assigned, and which receives privileged interest at the rate of 8 per cent., is to have debited to it the exact proportion of the value of the liabilities *under the present scale of benefits* which it is able to meet.

If the Incumbent (New Rules), Contingent, and Potential Benefits be increased all round by 14 per cent., the value of these liabilities would be increased to 16,356,510 Rs. in the Ordinary Branch, and 26,311,705 Rs. in the Additional Branch. This would give for the proportion of liabilities to be met by the Ordinary Branch, $m = \cdot 68585$, and for the Additional Branch, $1 - m = \cdot 31415$, thus leaving in the latter Branch an unappropriated surplus of 14,892 rupees only.

As this Report has been so long delayed (the delay, however, having been occasioned by various circumstances for which the author is in no way responsible), it has been considered on the whole expedient on the present occasion not to enter into any detailed investigation as to the growth of the surplus during the last five years, nor into the various propositions made some five years ago for the appropriation of the surplus.

There can, however, be no doubt that the experience of the Fund during the last five years has been extremely favourable. As pointed out in Chapter X., the rate of marriage among bachelors was considerably less than that given by the tables deduced from the Fund's experience. The effect of this in itself would be considerable, as liabilities anticipated to become contingent during the course of the five years still remained potential at the end of the time. There appear, moreover, to be indications that the rates of mortality and marriage prevailing among the pensioners had been favourable to the Fund.

As regards the proposed schemes for appropriation of surplus, it is probable that, as the said proposals were put forward so long ago, various causes may have brought about a change of views in respect thereof, so that any lengthened examination made of these proposals might not prove of much use under the present circumstances.

This course is the more necessary from the fact that it appears to have been decided that any appropriation of surplus shall have retrospective effect from 1st April 1873. This would, in itself, materially affect any scheme for the distribution of the surplus. Speaking generally, it is to be desired that the scheme of distribution finally resolved upon should be of such a nature that its cost could be, as far as possible, accurately estimated, without having to fall back upon crude approximations.

Another point in connection with this matter calling for consideration, would be the question of whether the surplus is to be allotted among all the Members or Pensioners existing as at the date of valuation, or whether only among those of a certain standing in the Fund.

In addition, it will have to be decided whether any addition made to a given benefit is to apply to all such benefits, whether incumbent, contingent, or potential. The question also must be considered, whether any addition to benefits is intended to apply to all future Members of the Fund. As specially bearing upon this point, attention is particularly drawn to the end of Chapter IX.

Finally, it is recommended that, before appropriating any of the surplus the claim set up on behalf of the Government be disposed of.

I have the honour to be,

GENTLEMEN,

Your obedient Servant,

WM. SUTTON,
*Actuary.*

25*th June* 1879.

# APPENDIX.

TABLE I.—*Showing for each year from entry into the Fund, the Rate of Mortality among the Members (Active and Retired) as deduced from the Experience during the years* 1850 – 1872, *both inclusive, and the number living, and* D *and* N *columns, and curtate Annuity Values at* 8 *per cent. and* 5 *per cent. respectively.*

| Years completed from Entry (m) | Rate of Mortality per cent. | Number living at beginning of year. | Interest at 8 per cent. | | | Interest at 5 per cent. | | |
|---|---|---|---|---|---|---|---|---|
| | | | $D_m$ | $N_m$ | Value of Annuity. $a_m$ | $D_m$ | $N_m$ | Value of Annuity. $a_m$ |
| 0 | 1·00 | 10,000 | 10000· | 104701· | 10·47 | 10000· | 148199· | 14·82 |
| 1 | 1·08 | 9,900 | 9167· | 95534· | 10·42 | 9428· | 138771· | 14·72 |
| 2 | 1·12 | 9,792 | 8397· | 87137· | 10·38 | 8882· | 129889· | 14·63 |
| 3 | 1·16 | 9,682 | 7686· | 79151· | 10·34 | 8361· | 121525· | 14·53 |
| 4 | 1·16 | 9,570 | 7034· | 72417· | 10·30 | 7873· | 113652· | 14·44 |
| 5 | 1·16 | 9,457 | 6437· | 65980· | 10·25 | 7412· | 106240· | 14·34 |
| 6 | 1·22 | 9,347 | 5891· | 60089· | 10·20 | 6976· | 99261· | 14·23 |
| 7 | 1·29 | 9,234 | 5388· | 54701· | 10·15 | 6563· | 92701· | 14·13 |
| 8 | 1·36 | 9,115 | 4925· | 49776· | 10·11 | 6170· | 86531· | 14·03 |
| 9 | 1·36 | 8,992 | 4499· | 45277· | 10·07 | 5797· | 80734· | 13·93 |
| 10 | 1·40 | 8,871 | 4110· | 41167· | 10·02 | 5446· | 75288· | 13·82 |
| 11 | 1·42 | 8,747 | 3752· | 37415· | 9·97 | 5115· | 70173· | 13·72 |
| 12 | 1·45 | 8,623 | 3425· | 33090· | 9·93 | 4802· | 65371· | 13·61 |
| 13 | 1·47 | 8,499 | 3125· | 30865· | 9·87 | 4507· | 60861· | 13·51 |
| 14 | 1·49 | 8,375 | 2852· | 28013· | 9·82 | 4230· | 56634· | 13·39 |
| 15 | 1·50 | 8,250 | 2601· | 25412· | 9·77 | 3969· | 52665· | 13·27 |
| 16 | 1·52 | 8,126 | 2372· | 23040· | 9·71 | 3723· | 48942· | 13·15 |
| 17 | 1·52 | 8,002 | 2163· | 20877· | 9·65 | 3492· | 45450· | 13·02 |
| 18 | 1·53 | 7,879 | 1972· | 18905· | 9·59 | 3274· | 42176· | 12·88 |
| 19 | 1·54 | 7,759 | 1798· | 17107· | 9·52 | 3071· | 39105· | 12·74 |
| 20 | 1·56 | 7,640 | 1639· | 15468· | 9·44 | 2880· | 36225· | 12·58 |
| 21 | 1·58 | 7,523 | 1495· | 13973· | 9·35 | 2700· | 33525· | 12·42 |
| 22 | 1·61 | 7,404 | 1362· | 12611· | 9·26 | 2531· | 30994· | 12·24 |
| 23 | 1·65 | 7,286 | 1241· | 11370· | 9·16 | 2372· | 28622· | 12·07 |
| 24 | 1·70 | 7,164 | 1130· | 10240· | 9·06 | 2222· | 26400· | 11·88 |
| 25 | 1·75 | 7,043 | 1029· | 9211·5 | 8·96 | 2080· | 24320· | 11·69 |
| 26 | 1·82 | 6,920 | 935·7 | 8275·8 | 8·85 | 1946· | 22374· | 11·50 |
| 27 | 1·90 | 6,793 | 850·6 | 7425·2 | 8·73 | 1820· | 20554· | 11·30 |
| 28 | 2·00 | 6,665 | 772·5 | 6652·7 | 8·61 | 1700· | 18854· | 11·09 |
| 29 | 2·06 | 6,531 | 701·0 | 5951·7 | 8·49 | 1587· | 17267· | 10·88 |
| 30 | 2·16 | 6,397 | 635·8 | 5315·9 | 8·36 | 1480· | 15787· | 10·67 |
| 31 | 2·26 | 6,259 | 576·0 | 4739·9 | 8·23 | 1379· | 14408· | 10·45 |
| 32 | 2·37 | 6,118 | 521·2 | 4218·7 | 8·09 | 1284· | 13124· | 10·23 |
| 33 | 2·48 | 5,973 | 471·2 | 3747·5 | 7·95 | 1194· | 11930· | 9·99 |
| 34 | 2·60 | 5,825 | 425·5 | 3322·0 | 7·81 | 1109· | 10821· | 9·76 |
| 35 | 2·73 | 5,674 | 383·8 | 2938·2 | 7·66 | 1029· | 9792·4 | 9·52 |
| 36 | 2·86 | 5,520 | 345·6 | 2592·6 | 7·50 | 953·0 | 8839·4 | 9·28 |
| 37 | 2·99 | 5,362 | 310·9 | 2281·7 | 7·34 | 881·7 | 7957·7 | 9·03 |
| 38 | 3·14 | 5,201 | 279·3 | 2002·4 | 7·17 | 814·6 | 7143·1 | 8·77 |
| 39 | 3·29 | 5,037 | 250·5 | 1751·9 | 7·00 | 751·2 | 6391·9 | 8·49 |
| 40 | 3·49 | 4,872 | 224·3 | 1527·6 | 6·81 | 692·0 | 5699·9 | 8·24 |
| 41 | 3·71 | 4,702 | 200·4 | 1327·2 | 6·62 | 636·0 | 5063·9 | 7·96 |
| 42 | 3·95 | 4,527 | 178·6 | 1148·6 | 6·43 | 583·2 | 4480·7 | 7·68 |
| 43 | 4·20 | 4·348 | 158·9 | 989·7 | 6·23 | 533·6 | 3947·1 | 7·40 |
| 44 | 4·47 | 4,166 | 141·0 | 848·7 | 6·02 | 486·8 | 3460·3 | 7·11 |
| 45 | 4·75 | 3,979 | 124·7 | 724·0 | 5·81 | 442·9 | 3017·4 | 6·81 |
| 46 | 5·05 | 3,790 | 110·0 | 614·03 | 5·58 | 401·8 | 2615·6 | 6·51 |
| 47 | 5·37 | 3,599 | 96·68 | 517·35 | 5·35 | 363·3 | 2252·3 | 6·20 |
| 48 | 5·71 | 3,406 | 84·71 | 432·64 | 5·11 | 327·4 | 1924·9 | 5·88 |
| 49 | 6·07 | 3,211 | 73·95 | 358·69 | 4·85 | 294·1 | 1630·8 | 5·55 |
| 50 | 6·80 | 3,016 | 64·32 | 294·37 | 4·58 | 263·0 | 1367·8 | 5·20 |
| 51 | 7·62 | 2,811 | 55·50 | 238·87 | 4·30 | 233·4 | 1134·4 | 4·86 |
| 52 | 8·54 | 2,597 | 47·18 | 191·39 | 4·03 | 205·5 | 928·0 | 4·52 |
| 53 | 9·57 | 2,375 | 40·20 | 151·19 | 3·76 | 178·9 | 750·0 | 4·20 |
| 54 | 10·72 | 2,148 | 33·66 | 117·53 | 3·49 | 154·1 | 595·0 | 3·87 |
| 55 | 12·02 | 1,918 | 27·83 | 89·70 | 3·22 | 131·0 | 464·9 | 3·55 |
| 56 | 13·47 | 1,687 | 22·67 | 67·03 | 2·96 | 109·8 | 355·07 | 3·23 |
| 57 | 15·09 | 1,460 | 18·16 | 48·87 | 2·69 | 90·50 | 264·57 | 2·92 |
| 58 | 16·91 | 1,240 | 14·28 | 34·59 | 2·42 | 73·18 | 191·39 | 2·62 |
| 59 | 18·95 | 1,030 | 10·99 | 23·596 | 2·15 | 57·90 | 133 49 | 2·31 |
| 60 | 22·38 | 835 | 8·248 | 15·348 | 1·86 | 44·70 | 88·79 | 1·99 |
| 61 | 26·43 | 648 | 5·928 | 9·420 | 1·59 | 33·05 | 55·74 | 1·69 |
| 62 | 31·21 | 477 | 4·037 | 5·383 | 1·33 | 23·16 | 32·58 | 1·41 |
| 63 | 36·86 | 328 | 2·572 | 2·811 | 1·09 | 15·17 | 17·411 | 1·15 |
| 64 | 43·53 | 207 | 1·504 | 1·3070 | ·87 | 9·123 | 8·288 | ·91 |
| 65 | 51·41 | 117 | ·7862 | ·5208 | ·66 | 4·906 | 3·382 | ·69 |
| 66 | 60·71 | 57 | ·3536 | ·1672 | ·47 | 2·270 | 1·1117 | ·49 |
| 67 | 71·70 | 22 | ·1287 | ·03849 | ·30 | ·8494 | ·2623 | ·31 |
| 68 | 84·67 | 6 | ·03271 | ·004785 | ·14 | ·2289 | ·03342 | ·15 |
| 69 | ... | 1 | ·004785 | .. | .. | ·03342 | ... | ... |

TABLE I. (A)—*Showing the present value,* IN RUPEES, *of Ordinary Subscriptions of* 2½ *per cent. on Active Service Salaries, and of* 1½ *per cent. on Retiring Pensions of* £1,000 *a-year, deduced from the Mortality Table given in* TABLE I. *of the Appendix, and the scale of Average Salaries given in* TABLE C (Chapter VI.), *the assumptions as to Retirements being those indicated in the Table in Chapter V. Interest at* 8 *per cent.*

| Completed years from Entry. (*m*) | Log ($D_m$). | Log Ordinary 2½ per cent. Subscription. | | Interest at 8 per cent. | |
|---|---|---|---|---|---|
| | | | | Present Value of | |
| | | Active. | Retired. | Ordinary Subscription of 2½ per cent. on Active Service Salaries. | Retired Subscription of 1½ per cent. on £1,000 a-year. |
| | | | | Rs. | Rs. |
| 0 | 3·9978 | 2·0792 | ... | 2763 | 85 |
| 1 | ·9599 | ·1014 | ... | 2887 | 93 |
| 2 | ·9216 | ·1370 | ... | 3015 | 101 |
| 3 | ·8832 | ·1761 | ... | 3144 | 111 |
| 4 | ·8446 | ·2135 | ... | 3272 | 121 |
| 5 | ·8061 | ·2487 | ... | 3397 | 132 |
| 6 | ·7675 | ·2792 | ... | 3522 | 144 |
| 7 | ·7286 | ·3077 | ... | 3645 | 158 |
| 8 | ·6893 | ·3326 | ... | 3775 | 173 |
| 9 | ·6501 | ·3556 | ... | 3899 | 189 |
| 10 | ·6107 | ·3930 | ... | 4021 | 207 |
| 11 | ·5711 | ·4323 | ... | 4134 | 227 |
| 12 | ·5315 | ·4674 | ... | 4233 | 249 |
| 13 | ·4917 | ·5008 | ... | 4322 | 273 |
| 14 | ·4518 | ·5309 | ... | 4391 | 299 |
| 15 | ·4118 | ·5833 | ... | 4438 | 328 |
| 16 | ·3717 | ·6400 | ... | 4440 | 359 |
| 17 | ·3316 | ·6896 | ... | 4385 | ·394 |
| 18 | ·2916 | ·7341 | ... | 4269 | 432 |
| 19 | ·2513 | ·7520 | ... | 4106 | 474 |
| 20 | ·2113 | ·7689 | ... | 3896 | 520 |
| 21 | ·1710 | ·7855 | ... | 3649 | 571 |
| 22 | ·1307 | ·8012 | ... | 3352 | 626 |
| 23 | ·0901 | ·8164 | ... | 3006 | 688 |
| 24 | ·0493 | ·8312 | ... | 2603 | 755 |
| 25 | ·0084 | ·7746 | 1·2730 | 2189 | 820 |
| 26 | 2·9671 | ·7104 | ·5593 | 1824 | 874 |
| 27 | ·9256 | ·6433 | ·7097 | 1505 | 916 |
| 28 | ·8835 | ·5755 | ·8045 | 1228 | 949 |
| 29 | ·8412 | ·4891 | ·8822 | 993 | 973 |
| 30 | ·7985 | ·4195 | ·9294 | 793 | 989 |
| 31 | ·7555 | ·3282 | ·9720 | 624 | 998 |
| 32 | ·7118 | ·2467 | 2·0000 | 484 | 1002 |
| 33 | ·6677 | ·1642 | ·0212 | 365 | 1002 |
| 34 | ·6232 | ·0883 | ·0364 | 262 | 997 |
| 35 | ·5781 | ·0005 | ·0511 | 173 | 990 |
| 36 | ·5324 | 1·8590 | ·0654 | 101 | 978 |
| 37 | ·4860 | ·6289 | ·0792 | 50 | 963 |
| 38 | ·4391 | ·3404 | ·0881 | 22 | 946 |
| 39 | ·3915 | ·0745 | ·0925 | 6 | 925 |
| 40 | ·3430 | ... | ·0969 | ... | 902 |
| 41 | ·2937 | ... | ·0969 | ... | 878 |
| 42 | ·2438 | ... | ·0969 | ... | 854 |
| 43 | ·1919 | ... | ·0969 | ... | 828 |
| 44 | ·1392 | ... | ·0969 | ... | 802 |
| 45 | ·0852 | ... | ·0969 | ... | 775 |
| 46 | ·0300 | ... | ·0969 | ... | 746 |
| 47 | 1·9734 | ... | ·0969 | ... | 717 |
| 48 | ·9152 | ... | ·0969 | ... | 685 |
| 49 | ·8554 | ... | ·0969 | ... | 652 |
| 50 | ·7931 | ... | ·0969 | ... | 618 |
| 51 | ·7274 | ... | ·0969 | ... | 584 |
| 52 | ·6576 | ... | ·0969 | ... | 550 |
| 53 | ·5828 | ... | ·0969 | ... | 517 |
| 54 | ·5032 | ... | ·0969 | ... | 483 |
| 55 | ·4175 | ... | ·0969 | ... | 449 |
| 56 | ·3250 | ... | ·0969 | ... | 417 |
| 57 | ·2251 | ... | ·0969 | ... | 383 |
| 58 | ·1164 | ... | ·0969 | ... | 349 |
| 59 | 0·9974 | ... | ·0969 | ... | 315 |
| 60 | ·8644 | ... | ·0969 | ... | 280 |
| 61 | ·7109 | ... | ·0969 | ... | 247 |
| 62 | ·5319 | ... | ·0969 | ... | 217 |
| 63 | ·3208 | ... | ·0969 | ... | 188 |
| 64 | ·0704 | ... | ·0969 | ... | 161 |
| 65 | 1·7670 | ... | ·0969 | ... | 136 |
| 66 | ·3851 | ... | ·0969 | ... | 115 |
| 67 | 2·9067 | ... | ·0969 | ... | 95 |
| 68 | ·2713 | ... | ·0969 | ... | 79 |
| 69 | 3·3928 | ... | ·0969 | ... | 62 |

NOTE.—For Method of Construction, *see* Chapter VII.

TABLE II.—Sons' Benefits.—*Value of the Temporary Annuities, immediate and deferred, payable quarterly in advance, to fatherless sons, deduced from the Experience of the Fund*, 1850—1872, *both inclusive.*

(*Interest at* 8 *per cent.*)

| Age $x$. | £30 Annuity up to 21. | £30 Annuity from 5 to 21. | £20 Annuity from 8 to 21. | £20 Annuity from 11 to 21. | Total value of Benefit. | |
|---|---|---|---|---|---|---|
| | | | | | At Age $x$. | At Age $x+\frac{1}{4}$. |
| | £ | £ | £ | £ | £ | £ |
| 0 | 267·88 | 155·56 | 72·96 | 48·85 | 545·24 | 576·36 |
| 1 | 281·43 | 182·75 | 85·71 | 57·39 | 607·28 | 632·76 |
| 2 | 287·59 | 207·88 | 97·49 | 65·28 | 658·25 | 674·49 |
| 3 | 283·83 | 228·21 | 107·03 | 71·66 | 690·74 | 707·10 |
| 4 | 278·61 | 249·51 | 117·02 | 78·33 | 723·47 | 739·77 |
| 5 | 271·68 | 271·68 | 127·42 | 85·30 | 756·08 | 757·37 |
| 6 | 263·71 | 263·70 | 138·52 | 92·73 | 758·67 | 759·61 |
| 7 | 254·74 | 254·73 | 150·41 | 100·69 | 760·56 | 761·09 |
| 8 | 244·66 | 244·66 | 163·10 | 109·20 | 761·62 | 751·22 |
| 9 | 233·46 | 233·46 | 155·64 | 118·27 | 740·83 | 729·56 |
| 10 | 221·31 | 221·31 | 147·55 | 128·13 | 718·30 | 706·14 |
| 11 | 208·19 | 208·19 | 138·80 | 138·80 | 693·98 | 670·82 |
| 12 | 194·00 | 194·00 | 129·33 | 129·33 | 646·66 | 621·10 |
| 13 | 178·66 | 178·66 | 119·11 | 119·11 | 595·54 | 567·82 |
| 14 | 162·03 | 162·03 | 108·02 | 108·03 | 540·11 | 510·17 |
| 15 | 144·07 | 144·07 | 96·05 | 96·04 | 480·23 | 447·76 |
| 16 | 124·59 | 124·59 | 83·06 | 83·06 | 415·30 | 380·20 |
| 17 | 103·53 | 103·53 | 69·02 | 69·02 | 345·10 | 307·04 |
| 18 | 80·69 | 80·69 | 53·80 | 53·80 | 268·98 | 227·71 |
| 19 | 55·93 | 55·93 | 37·29 | 37·29 | 186·44 | 141·73 |
| 20 | 29·11 | 29·11 | 19·41 | 19·40 | 97·03 | 48·51 |

(*Interest at* 5 *per cent.*)

| Age $x$. | £30 Annuity up to 21. | £30 Annuity from 5 to 21. | £20 Annuity from 8 to 21. | £20 Annuity from 11 to 21. | Total value of Benefit. | |
|---|---|---|---|---|---|---|
| | | | | | At Age $x$. | At Age $x+\frac{1}{4}$. |
| | £ | £ | £ | £ | £ | £ |
| 0 | 334·36 | 214·86 | 106·51 | 75·18 | 730·90 | 766·50 |
| 1 | 349·11 | 245·45 | 121·68 | 85·87 | 802·11 | 828·61 |
| 2 | 354·12 | 271·45 | 134·57 | 94·98 | 855·12 | 868·23 |
| 3 | 346·67 | 289·71 | 143·61 | 101·35 | 881·34 | 893·52 |
| 4 | 337·34 | 307·95 | 152·67 | 107·74 | 905·70 | 916·62 |
| 5 | 326·00 | 326·00 | 161·60 | 114·04 | 927·65 | 922·94 |
| 6 | 313·45 | 313·45 | 170·80 | 120·52 | 918·23 | 912·81 |
| 7 | 299·90 | 299·90 | 180·33 | 127·27 | 907·39 | 900·99 |
| 8 | 285·17 | 285·17 | 190·10 | 134·15 | 894·59 | 876·99 |
| 9 | 269·29 | 269·29 | 179·54 | 141·28 | 859·40 | 840·94 |
| 10 | 252·63 | 252·63 | 168·42 | 148·81 | 822·49 | 803·06 |
| 11 | 235·09 | 235·09 | 156·73 | 156·72 | 783·63 | 752·84 |
| 12 | 216·62 | 216·62 | 144·41 | 144·41 | 722·06 | 689·72 |
| 13 | 197·21 | 197·21 | 131·48 | 131·48 | 657·38 | 622·34 |
| 14 | 176·79 | 176·79 | 117·86 | 117·86 | 589·30 | 553·43 |
| 15 | 155·27 | 155·27 | 103·51 | 103·52 | 517·57 | 479·89 |
| 16 | 132·67 | 132·67 | 88·44 | 88·44 | 442·22 | 403·47 |
| 17 | 108·82 | 108·82 | 72·54 | 72·54 | 362·72 | 320·44 |
| 18 | 83·75 | 83·75 | 55·83 | 55·84 | 279·17 | 235·07 |
| 19 | 57·29 | 57·29 | 38·19 | 38·20 | 190·97 | 144·52 |
| 20 | 29·42 | 29·42 | 19·61 | 19·62 | 98·07 | 49·03 |

TABLE III.—Daughters' Benefits.—*Value of the Annuities, immediate and deferred, payable quarterly in advance, until Marriage or Death, to fatherless daughters, deduced from the Experience of the Fund, 1850—1872, both inclusive.*

(*Interest at 8 per cent.*)

| Age $x$. | Value of Annuity till Marriage or death. | Value of Annuity till Marriage or Death, to commence at | | | Value of | | | | Total Value of £100 a-year till Marriage or Death. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Age 5. | Age 8. | Age 11. | £30 a-year till Death or Marriage. | £30 a-year till Death or Marriage, from Age 5. | £20 a-year till Death or Marriage, from Age 8. | £20 a-year till Death or Marriage, from Age 11. | At Age $x$. | At Age $x+\frac{1}{2}$. |
| | £ | | | | £ | £ | £ | £ | £ | £ |
| 0 | 9·826 | 6·056 | 4·502 | 3·280 | 294·78 | 181·68 | 90·04 | 65·60 | 632·10 | 668·2 |
| 1 | 10·360 | 7·071 | 5·248 | 3·823 | 310·80 | 212·13 | 104·96 | 76·46 | 704·35 | 736·6 |
| 2 | 10·698 | 8·044 | 5·973 | 4·358 | 320·94 | 241·32 | 119·46 | 87·16 | 768·88 | 790·0 |
| 3 | 10·674 | 8·818 | 6·550 | 4·772 | 320·22 | 264·54 | 131·00 | 95·44 | 811·20 | 832·1 |
| 4 | 10·587 | 9·613 | 7·146 | 5·205 | 317·61 | 288·39 | 142·92 | 104·10 | 853·02 | 874·6 |
| 5 | 10·460 | ... | 7·772 | 5·666 | 313·80 | 313·80 | 155·44 | 113·32 | 896·36 | 903·2 |
| 6 | 10·305 | ... | 8·438 | 6·154 | 309·15 | 309·15 | 168·76 | 123·08 | 910·14 | 917·5 |
| 7 | 10·132 | ... | 9·164 | 6·679 | 303·96 | 303·96 | 183·28 | 133·58 | 924·78 | 932·4 |
| 8 | 9·939 | ... | ... | 7·241 | 298·17 | 298·17 | 198·78 | 144·82 | 939·94 | 937·3 |
| 9 | 9·720 | ... | ... | 7·849 | 291·60 | 291·60 | 194·40 | 156·98 | 934·58 | 931·4 |
| 10 | 9·476 | ... | ... | 8·504 | 284·28 | 284·28 | 189·52 | 170·08 | 928·16 | 924·7 |

| Age $x$. | Total value of £100 a year till Marriage or Death. | | Age $x$. | Total value of £100 a year till Marriage or Death. | | Age $x$. | Total value of £100 a year till Marriage or Death. | |
|---|---|---|---|---|---|---|---|---|
| | At Age $x$. | At Age $x+\frac{1}{2}$. | | At Age $x$. | At Age $x+\frac{1}{2}$ | | At Age $x$. | At Age $x+\frac{1}{2}$. |
| | £ | £ | | £ | £ | | £ | £ |
| 11 | 921·3 | 907·0 | 41 | 1003·6 | 1004·9 | 71 | 612·2 | 601·6 |
| 12 | 892·8 | 877·3 | 42 | 1006·2 | 1006·1 | 72 | 591·0 | 580·4 |
| 13 | 861·9 | 845·4 | 43 | 1006·1 | 1005·7 | 73 | 569·8 | 559·3 |
| 14 | 828·9 | 811·4 | 44 | 1005·2 | 1004·8 | 74 | 548·8 | 538·3 |
| 15 | 793·9 | 775·3 | 45 | 1004·4 | 1003·5 | 75 | 527·9 | 517·5 |
| 16 | 756·8 | 740·7 | 46 | 1002·6 | 1000·1 | 76 | 507·1 | 496·8 |
| 17 | 724·5 | 710·9 | 47 | 997·7 | 994·8 | 77 | 486·6 | 476·4 |
| 18 | 697·3 | 693·4 | 48 | 991·9 | 988·2 | 78 | 466·2 | 456·2 |
| 19 | 689·5 | 693·0 | 49 | 984·6 | 979·9 | 79 | 446·3 | 436·7 |
| 20 | 696·5 | 707·0 | 50 | 975·3 | 969·3 | 80 | 427·1 | 417·4 |
| 21 | 717·5 | 728·1 | 51 | 963·4 | 956·6 | 81 | 407·8 | 398·5 |
| 22 | 738·8 | 749·2 | 52 | 949·8 | 943·1 | 82 | 389·3 | 380·0 |
| 23 | 759·7 | 770·8 | 53 | 936·5 | 929·6 | 83 | 370·7 | 361·7 |
| 24 | 781·9 | 793·1 | 54 | 922·8 | 915·5 | 84 | 352·7 | 343·6 |
| 25 | 804·4 | 815·8 | 55 | 908·2 | 900·8 | 85 | 334·6 | 325·7 |
| 26 | 827·3 | 838·8 | 56 | 893·4 | 885·8 | 86 | 316·9 | 307·9 |
| 27 | 850·2 | 860·7 | 57 | 878·1 | 870·1 | 87 | 299·0 | 289·7 |
| 28 | 871·2 | 879·9 | 58 | 862·2 | 853·9 | 88 | 280·4 | 270·8 |
| 29 | 888·6 | 896·1 | 59 | 845·7 | 837·2 | 89 | 261·3 | 250·5 |
| 30 | 903·7 | 910·4 | 60 | 828·7 | 820·0 | 90 | 239·7 | 227·4 |
| 31 | 917·1 | 923·2 | 61 | 811·3 | 802·1 | 91 | 215·1 | 201·3 |
| 32 | 929·4 | 935·0 | 62 | 793·0 | 783·5 | 92 | 187·5 | 172·7 |
| 33 | 940·6 | 945·9 | 63 | 774·1 | 764·5 | 93 | 157·9 | 146·4 |
| 34 | 951·3 | 956·3 | 64 | 755·0 | 745·1 | 94 | 135·0 | 124·1 |
| 35 | 961·3 | 966·0 | 65 | 735·2 | 725·3 | 95 | 113·2 | 99·4 |
| 36 | 970·8 | 975·2 | 66 | 715·4 | 705·3 | 96 | 85·7 | 42·8 |
| 37 | 979·6 | 983·5 | 67 | 695·2 | 685·0 | | | |
| 38 | 987·5 | 990·8 | 68 | 674·8 | 664·4 | | | |
| 39 | 994·2 | 996·8 | 69 | 654·0 | 643·5 | | | |
| 40 | 999·5 | 1001·5 | 70 | 633·1 | 622·7 | | | |

## TABLE III.—(*continued*).

(*Interest at 5 per cent.*)

| Age $x$. | Value of Annuity till Marriage or death. | Value of Annuity till Marriage or Death, to commence at | | | Value of | | | | Total Value of £100 a-year till Marriage or Death. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Age 5. | Age 8. | Age 11. | £30 a-year till Death or Marriage. | £30 a-year till Death or Marriage, from Age 5. | £20 a-year till Death or Marriage, from Age 8. | £20 a-year till Death or Marriage, from Age 11. | At Age $x$. | At Age $x+\frac{1}{2}$. |
| | £ | | | | £ | £ | £ | £ | £ | £ |
| 0 | 13·204 | 9·203 | 7·336 | 5·748 | 396·12 | 276·09 | 146·72 | 114·96 | 933·89 | 980·3 |
| 1 | 13·893 | 10·431 | 8·319 | 6·530 | 416·79 | 312·93 | 166·38 | 130·60 | 1026·70 | 1065·0 |
| 2 | 14·297 | 11·535 | 9·199 | 7·218 | 428·91 | 346·05 | 183·98 | 144·36 | 1103·30 | 1124·3 |
| 3 | 14·205 | 12·294 | 9·820 | 7·692 | 426·15 | 368·82 | 196·40 | 153·84 | 1145·21 | 1164·6 |
| 4 | 14·029 | 13·053 | 10·415 | 8·166 | 420·87 | 391·59 | 208·30 | 163·32 | 1184·08 | 1202·4 |
| 5 | 13·798 | ... | 11·010 | 8·628 | 413·94 | 413·94 | 220·20 | 172·56 | 1220·64 | 1223·6 |
| 6 | 13·533 | ... | 11·618 | 9·114 | 405·99 | 405·99 | 232·36 | 182·28 | 1226·62 | 1229·5 |
| 7 | 13·247 | ... | 12·265 | 9·612 | 397·41 | 397·41 | 245·30 | 192·24 | 1232·36 | 1235·1 |
| 8 | 12·938 | ... | ... | 10·145 | 388·14 | 388·14 | 258·76 | 202·90 | 1237·94 | 1229·8 |
| 9 | 12·599 | ... | ... | 10·691 | 377·97 | 377·97 | 251·98 | 213·82 | 1221·74 | 1212·9 |
| 10 | 12·235 | ... | ... | 11·259 | 367·05 | 367·05 | 244·70 | 225·18 | 1203·98 | 1194·6 |

| Age $x$. | Total value of £100 a year till Marriage or Death. | | Age $x$. | Total value of £100 a year till Marriage or Death. | | Age $x$. | Total value of £100 a year till Marriage or Death. | |
|---|---|---|---|---|---|---|---|---|
| | At Age $x$. | At Age $x+\frac{1}{2}$. | | At Age $x$. | At Age $x+\frac{1}{2}$. | | At Age $x$. | At Age $x+\frac{1}{2}$. |
| | £ | £ | | £ | £ | | £ | £ |
| 11 | 1185·2 | 1165·0 | 41 | 1337·0 | 1336·8 | 71 | 705·8 | 691·7 |
| 12 | 1144·9 | 1123·6 | 42 | 1336·7 | 1334·6 | 72 | 677·7 | 667·7 |
| 13 | 1102·4 | 1080·3 | 43 | 1332·5 | 1329·7 | 73 | 657·8 | 640·7 |
| 14 | 1058·3 | 1035·5 | 44 | 1326·9 | 1323·9 | 74 | 623·7 | 610·2 |
| 15 | 1012·8 | 989·3 | 45 | 1321·0 | 1317·3 | 75 | 596·8 | 583·6 |
| 16 | 965·8 | 946·1 | 46 | 1313·7 | 1307·9 | 76 | 570·4 | 557·4 |
| 17 | 926·4 | 911·1 | 47 | 1302·1 | 1295·5 | 77 | 544·5 | 531·8 |
| 18 | 895·8 | 892·5 | 48 | 1289·0 | 1281·4 | 78 | 519·2 | 506·9 |
| 19 | 889·2 | 896·3 | 49 | 1273·9 | 1265·0 | 79 | 494·6 | 482·7 |
| 20 | 903·5 | 919·7 | 50 | 1256·2 | 1245·6 | 80 | 470·9 | 459·2 |
| 21 | 936·0 | 952·6 | 51 | 1235·1 | 1223·5 | 81 | 447·5 | 436·3 |
| 22 | 969·2 | 985·3 | 52 | 1212·0 | 1200·6 | 82 | 425·1 | 414·0 |
| 23 | 1001·5 | 1018·4 | 53 | 1189·2 | 1177·6 | 83 | 402·9 | 392·2 |
| 24 | 1035·4 | 1052·4 | 54 | 1166·0 | 1154·0 | 84 | 381·5 | 370 8 |
| 25 | 1069·5 | 1086·6 | 55 | 1142·0 | 1129·8 | 85 | 360·1 | 349·8 |
| 26 | 1103·7 | 1120·6 | 56 | 1117·7 | 1105·3 | 86 | 339·5 | 329·1 |
| 27 | 1137·5 | 1152·8 | 57 | 1093·0 | 1080·3 | 87 | 318·7 | 308·0 |
| 28 | 1168·2 | 1180·8 | 58 | 1067·7 | 1054·8 | 88 | 297·3 | 286·4 |
| 29 | 1193·5 | 1204·4 | 59 | 1041·9 | 1028·8 | 89 | 275·5 | 263·3 |
| 30 | 1215·4 | 1224·9 | 60 | 1015·7 | 1002·0 | 90 | 251·2 | 237·5 |
| 31 | 1234·5 | 1243·0 | 61 | 988·3 | 974·5 | 91 | 223·9 | 208·9 |
| 32 | 1251·6 | 1259·2 | 62 | 960·8 | 946·8 | 92 | 193·9 | 178·1 |
| 33 | 1266·9 | 1278·9 | 63 | 932·9 | 918·8 | 93 | 162·3 | 150·1 |
| 34 | 1280·9 | 1287·4 | 64 | 904·8 | 890·5 | 94 | 137·9 | 126·4 |
| 35 | 1293·9 | 1299·7 | 65 | 876·3 | 862·1 | 95 | 114·9 | 100·6 |
| 36 | 1305·5 | 1310·6 | 66 | 848·0 | 833·7 | 96 | 86·3 | 74·4 |
| 37 | 1315·7 | 1320·0 | 67 | 819·5 | 805·3 | | | |
| 38 | 1324·3 | 1327·5 | 68 | 791·1 | 776·8 | | | |
| 39 | 1330·8 | 1332·8 | 69 | 762·5 | 748·3 | | | |
| 40 | 1334·9 | 1335·9 | 70 | 734·1 | 719·9 | | | |

TABLE IV.—Daughters' Benefits.—*Value of a Marriage Portion to fatherless daughters, as deduced from the Experience of the Fund*, 1850-1872, *both inclusive.*

| Age last Birth-day. | Interest at 8 per cent. | | Interest at 5 per cent. | | Age last Birth-day. | Interest at 8 per cent. | | Interest at 5 per cent. | |
|---|---|---|---|---|---|---|---|---|---|
| | Value of £1. | Value of £300. | Value of £1. | Value of £300. | | Value of £1. | Value of £300. | Value of £1. | Value of £300. |
| | £ | £ | £ | £ | | £ | £ | £ | £ |
| 0 | ·097 | 29·1 | ·180 | 54·0 | 25 | ·308 | 92·4 | ·347 | 104·1 |
| 1 | ·111 | 33·3 | ·200 | 60·0 | 26 | ·284 | 85·2 | ·320 | 96·0 |
| 2 | ·124 | 37·2 | ·217 | 65·1 | 27 | ·260 | 78·0 | ·293 | 87·9 |
| 3 | ·136 | 40·8 | ·231 | 69·3 | 28 | ·238 | 68·4 | ·268 | 80·4 |
| 4 | ·148 | 44·4 | ·244 | 73·2 | 29 | ·219 | 65·7 | ·247 | 74·1 |
| 5 | ·163 | 48·9 | ·258 | 77·4 | 30 | ·201 | 60·3 | ·227 | 68·1 |
| 6 | ·176 | 52·8 | ·273 | 81·9 | 31 | ·185 | 55·5 | ·208 | 62·4 |
| 7 | ·189 | 56·7 | ·288 | 86·4 | 32 | ·170 | 51·0 | ·190 | 57·0 |
| 8 | ·205 | 61·5 | ·303 | 90·9 | 33 | ·156 | 46·8 | ·174 | 52·2 |
| 9 | ·222 | 66·6 | ·319 | 95·7 | 34 | ·142 | 42·6 | ·157 | 47·1 |
| 10 | ·241 | 72·3 | ·336 | 100·8 | 35 | ·128 | 38·4 | ·141 | 42·3 |
| 11 | ·261 | 78·3 | ·354 | 106·2 | 36 | ·114 | 34·2 | ·126 | 37·8 |
| 12 | ·283 | 84·9 | ·373 | 111·9 | 37 | ·101 | 30·3 | ·111 | 33·3 |
| 13 | ·306 | 91·8 | ·393 | 117·9 | 38 | ·088 | 26·4 | ·096 | 28·8 |
| 14 | ·332 | 99·6 | ·414 | 124·2 | 39 | ·076 | 22·8 | ·085 | 25·5 |
| 15 | ·360 | 108·0 | ·437 | 131·1 | 40 | ·066 | 19·8 | ·070 | 21·0 |
| 16 | ·388 | 116·4 | ·459 | 137·7 | 41 | ·055 | 16·5 | ·059 | 17·7 |
| 17 | ·412 | 123·6 | ·477 | 143·1 | 42 | ·045 | 13·5 | ·048 | 14·4 |
| 18 | ·423 | 126·9 | ·484 | 145·2 | 43 | ·038 | 11·4 | ·040 | 12·0 |
| 19 | ·427 | 128·1 | ·483 | 144·9 | 44 | ·031 | 9·3 | ·032 | 9·6 |
| 20 | ·418 | 125·4 | ·470 | 141·0 | 45 | ·023 | 6·9 | ·024 | 7·2 |
| 21 | ·396 | 118·8 | ·446 | 133·8 | 46 | ·015 | 4·5 | ·016 | 4·8 |
| 22 | ·375 | 112·5 | ·422 | 126·6 | 47 | ·010 | 3·0 | ·010 | 3·0 |
| 23 | ·354 | 106·2 | ·398 | 119·4 | 48 | ·006 | 1·8 | ·006 | 1·8 |
| 24 | ·331 | 99·3 | ·372 | 111·6 | 49 | ·002 | ·6 | ·003 | ·9 |

TABLE V.—*Showing the rates of Mortality and Marriage for Bachelors, as deduced from the Experience of the Fund,* 1850–1872 *inclusive, and the present values of Reversionary Annuities to their future Wives.*

| Years completed from Entry. | Rate of Mortality. | Rate of Marriage. | Number living as Bachelors at beginning of year. | Number Married in Year. | Value of Reversionary Annuity. | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | At 3 per cent. interest. | | | | At 5 per cent. interest. | | | |
| | | | | | Allowing for re-Marriage of Widows. | | Not allowing for re-Marriage of Widows. | | Allowing for re-Marriage of Widows. | | Not allowing for re-Marriage of Widows. | |
| | | | | | Pension of £1. | Pension of £300. | Pension of £1. | Pension of £300. | Pension of £1. | Pension of £300. | Pension of £1. | Pension of £300. |
| | | | | | £ | £ | £ | £ | £ | £ | £ | £ |
| 0 | ·0100 | ·0770 | 10,000 | 770 | ·930 | 279 | 1·025 | 308 | 2·190 | 657 | 2·405 | 722 |
| 1 | ·0108 | ·0780 | 9,130 | 712 | ·955 | 287 | 1·050 | 315 | 2·229 | 669 | 2·440 | 732 |
| 2 | ·0112 | ·0790 | 8,320 | 657 | ·982 | 295 | 1·076 | 323 | 2·269 | 681 | 2·476 | 743 |
| 3 | ·0116 | ·0800 | 7,568 | 605 | 1·011 | 303 | 1·103 | 331 | 2·311 | 693 | 2·512 | 754 |
| 4 | ·0116 | ·0850 | 6,875 | 586 | 1·040 | 312 | 1·131 | 339 | 2·354 | 706 | 2·552 | 766 |
| 5 | ·0116 | ·0900 | 6,211 | 559 | 1·069 | 321 | 1·159 | 348 | 2·390 | 717 | 2·583 | 775 |
| 6 | ·0122 | ·0950 | 5,581 | 530 | 1·095 | 329 | 1·182 | 355 | 2·422 | 727 | 2·606 | 782 |
| 7 | ·0129 | ·1000 | 4,983 | 498 | 1·118 | 335 | 1·202 | 361 | 2·448 | 734 | 2·624 | 787 |
| 8 | ·0136 | ·1050 | 4,421 | 464 | 1·137 | 341 | 1·218 | 365 | 2·465 | 740 | 2·633 | 790 |
| 9 | ·0136 | ·1150 | 3,897 | 448 | 1·153 | 346 | 1·230 | 369 | 2·476 | 743 | 2·634 | 790 |
| 10 | ·0140 | ·1300 | 3,395 | 441 | 1·159 | 348 | 1·231 | 369 | 2·465 | 740 | 2·616 | 785 |
| 11 | ·0142 | ·1500 | 2,907 | 436 | 1·146 | 344 | 1·212 | 364 | 2·421 | 726 | 2·558 | 767 |
| 12 | ·0145 | ·1300 | 2,430 | 316 | 1·098 | 330 | 1·157 | 357 | 2·321 | 696 | 2·441 | 732 |
| 13 | ·0147 | ·1150 | 2,078 | 239 | 1·058 | 317 | 1·110 | 333 | 2·231 | 669 | 2·338 | 701 |
| 14 | ·0149 | ·1100 | 1,809 | 199 | 1·024 | 307 | 1·069 | 321 | 2·149 | 645 | 2·245 | 674 |
| 15 | ·0150 | ·1000 | 1,583 | 158 | ·983 | 295 | 1·023 | 307 | 2·057 | 617 | 2·141 | 642 |
| 16 | ·0152 | ·0900 | 1,401 | 126 | ·943 | 283 | ·978 | 293 | 1·967 | 590 | 2·040 | 612 |
| 17 | ·0152 | ·0800 | 1,253 | 100 | ·906 | 272 | ·937 | 281 | 1·882 | 565 | 1·947 | 584 |
| 18 | ·0153 | ·0700 | 1,134 | 79 | ·874 | 262 | ·902 | 271 | 1·805 | 542 | 1·863 | 559 |
| 19 | ·0154 | ·0600 | 1,038 | 62 | ·848 | 254 | ·874 | 262 | 1·740 | 522 | 1·791 | 537 |
| 20 | ·0156 | ·0500 | 959 | 48 | ·833 | 250 | ·855 | 257 | 1·691 | 507 | 1·738 | 521 |
| 21 | ·0158 | ·0490 | 896 | 44 | ·829 | 249 | ·851 | 255 | 1·662 | 499 | 1·706 | 512 |
| 22 | ·0161 | ·0480 | 838 | 40 | ·824 | 247 | ·845 | 254 | 1·631 | 489 | 1·672 | 502 |
| 23 | ·0165 | ·0480 | 784 | 38 | ·818 | 245 | ·837 | 251 | 1·597 | 479 | 1·635 | 491 |
| 24 | ·0170 | ·0480 | 734 | 35 | ·807 | 242 | ·826 | 248 | 1·556 | 467 | 1·591 | 477 |
| 25 | ·0175 | ·0470 | 686 | 32 | ·795 | 239 | ·811 | 243 | 1·508 | 452 | 1·540 | 462 |
| 26 | ·0182 | ·0470 | 642 | 30 | ·778 | 233 | ·794 | 238 | 1·455 | 437 | 1·485 | 446 |
| 27 | ·0190 | ·0470 | 600 | 28 | ·757 | 227 | ·771 | 231 | 1·394 | 418 | 1·421 | 426 |
| 28 | ·0200 | ·0470 | 560 | 26 | ·729 | 219 | ·742 | 223 | 1·324 | 397 | 1·347 | 404 |
| 29 | ·0206 | ·0470 | 523 | 25 | ·696 | 209 | ·706 | 212 | 1·244 | 373 | 1·263 | 379 |
| 30 | ·0216 | ·0470 | 487 | 23 | ·652 | 196 | ·663 | 199 | 1·153 | 346 | 1·170 | 351 |
| 31 | ·0226 | ·0440 | 454 | 20 | ·602 | 181 | ·609 | 183 | 1·047 | 314 | 1·060 | 318 |
| 32 | ·0237 | ·0400 | 424 | 17 | ·548 | 164 | ·554 | 166 | ·941 | 282 | ·952 | 286 |
| 33 | ·0248 | ·0370 | 397 | 15 | ·495 | 149 | ·500 | 150 | ·837 | 251 | ·846 | 254 |
| 34 | ·0260 | ·0340 | 372 | 13 | ·441 | 132 | ·445 | 134 | ·735 | 221 | ·742 | 223 |
| 35 | ·0273 | ·0310 | 350 | 11 | ·386 | 116 | ·390 | 117 | ·633 | 190 | ·639 | 192 |
| 36 | ·0286 | ·0280 | 329 | 9 | ·332 | 100 | ·334 | 100 | ·536 | 161 | ·539 | 162 |
| 37 | ·0299 | ·0250 | 311 | 8 | ·276 | 83 | ·278 | 83 | ·440 | 132 | ·442 | 133 |
| 38 | ·0314 | ·0220 | 294 | 6 | ·222 | 67 | ·225 | 68 | ·349 | 105 | ·351 | 105 |
| 39 | ·0329 | ·0190 | 278 | 5 | ·171 | 51 | ·172 | 52 | ·264 | 79 | ·265 | 80 |
| 40 | ·0349 | ·0160 | 264 | 4 | ·122 | 37 | ·122 | 37 | ·185 | 56 | ·185 | 56 |
| 41 | ·0371 | ·0130 | 250 | 3 | ·077 | 23 | ·077 | 23 | ·113 | 34 | ·113 | 34 |
| 42 | ·0395 | ·0100 | 238 | 2 | ·036 | 11 | ·036 | 11 | ·053 | 16 | ·053 | 16 |

NOTE.—For present values of corresponding Additional Subscriptions, at 5 per cent. interest, *see* Table XI.

TABLE VI. (A)—*Showing the present value of a Reversionary Annuity to a Member's present wife only, and of the corresponding additional Subscriptions. The Rate of Mortality used for the Members is that deduced from the experience of the Fund*—1850-1872—(TABLE I. Appendix), *and the Rate of Mortality for the Wives and the Rate of Re-Marriage of Widows are those used by Mr. Brown.*

| Years completed from Entry. | Allowing for Reduction of Pension by Marriage. | | | | Not Allowing for Reduction of Pension by Marriage. | | | | Interest at 5 per cent. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Interest at 3 per cent. | | Interest at 5 per cent. | | Interest at 3 per cent. | | Interest at 5 per cent. | | Joint Life Log D. | Joint Life Annuity. | Value of 2 per cent. Subscription. | |
| | Value of £1 Pension. | Value of £300 Pension | Value of £1 Pension. | Value of £300 Pension | Value of £1 Pension. | Value of £300 Pension | Value of £1 Pension. | Value of £300 Pension | | | Active. | Retired. |
| | £ | £ | £ | £ | £ | £ | £ | £ | | | Rs. | Rs. |
| 0 | 1·401 | 420 | 2·756 | 827 | 1·595 | 479 | 3·146 | 944 | 4·0000 | 13·49 | 2870 | 126 |
| 1 | 1·433 | 430 | 2·805 | 842 | 1·627 | 488 | 3·192 | 958 | 3·9704 | 13·41 | 2972 | 135 |
| 2 | 1·463 | 439 | 2·850 | 855 | 1·656 | 497 | 3·232 | 970 | ·9404 | 13·33 | 3073 | 144 |
| 3 | 1·492 | 448 | 2·894 | 868 | 1·683 | 505 | 3·270 | 981 | ·9103 | 13·25 | 3176 | 155 |
| 4 | 1·522 | 457 | 2·939 | 882 | 1·711 | 513 | 3·308 | 992 | ·8799 | 13·18 | 3276 | 166 |
| 5 | 1·555 | 467 | 2·986 | 896 | 1·742 | 523 | 3·349 | 1005 | ·8496 | 13·10 | 3372 | 178 |
| 6 | 1·588 | 476 | 3·035 | 911 | 1·772 | 532 | 3·388 | 1016 | ·8193 | 13·00 | 3462 | 191 |
| 7 | 1·620 | 486 | 3·079 | 924 | 1·799 | 540 | 3·421 | 1026 | ·7887 | 12·92 | 3552 | 205 |
| 8 | 1·648 | 494 | 3·118 | 935 | 1·821 | 546 | 3·448 | 1034 | ·7579 | 12·83 | 3641 | 220 |
| 9 | 1·676 | 503 | 3·157 | 947 | 1·841 | 552 | 3·471 | 1041 | ·7267 | 12·75 | 3730 | 236 |
| 10 | 1·697 | 509 | 3·181 | 954 | 1·853 | 556 | 3·477 | 1043 | ·6956 | 12·65 | 3809 | 254 |
| 11 | 1·718 | 515 | 3·203 | 961 | 1·864 | 559 | 3·480 | 1044 | ·6682 | 12·45 | 3845 | 270 |
| 12 | 1·745 | 524 | 3·239 | 972 | 1·882 | 565 | 3·498 | 1049 | ·6368 | 12·34 | 3898 | 291 |
| 13 | 1·772 | 532 | 3·272 | 982 | 1·900 | 570 | 3·517 | 1055 | ·6051 | 12·24 | 3939 | 313 |
| 14 | 1·799 | 540 | 3·304 | 991 | 1·920 | 576 | 3·536 | 1061 | ·5732 | 12·13 | 3968 | 337 |
| 15 | 1·827 | 548 | 3·338 | 1001 | 1·941 | 582 | 3·557 | 1067 | ·5413 | 12·03 | 3974 | 362 |
| 16 | 1·856 | 557 | 3·373 | 1012 | 1·964 | 589 | 3·579 | 1074 | ·5091 | 11·91 | 3938 | 390 |
| 17 | 1·886 | 566 | 3·409 | 1023 | 1·989 | 597 | 3·603 | 1081 | ·4767 | 11·79 | 3859 | 420 |
| 18 | 1·921 | 576 | 3·449 | 1035 | 2·019 | 606 | 3·634 | 1090 | ·4443 | 11·68 | 3731 | 453 |
| 19 | 1·958 | 587 | 3·491 | 1047 | 2·050 | 615 | 3·667 | 1100 | ·4115 | 11·55 | 3562 | 488 |
| 20 | 1·996 | 599 | 3·534 | 1060 | 2·085 | 626 | 3·702 | 1111 | ·3789 | 11·40 | 3362 | 526 |
| 21 | 2·037 | 611 | 3·579 | 1074 | 2·122 | 637 | 3·739 | 1122 | ·3461 | 11·26 | 3128 | 568 |
| 22 | 2·081 | 624 | 3·626 | 1088 | 2·162 | 649 | 3·779 | 1134 | ·3132 | 11·11 | 2858 | 612 |
| 23 | 2·127 | 638 | 3·674 | 1102 | 2·205 | 662 | 3·821 | 1146 | ·2800 | 10·95 | 2550 | 661 |
| 24 | 2·173 | 652 | 3·723 | 1117 | 2·250 | 675 | 3·864 | 1159 | ·2465 | 10·79 | 2200 | 714 |
| 25 | 2·221 | 666 | 3·772 | 1132 | 2·296 | 689 | 3·907 | 1172 | ·2128 | 10·62 | 1847 | 765 |
| 26 | 2·271 | 681 | 3·819 | 1146 | 2·343 | 703 | 3·950 | 1185 | ·1788 | 10·45 | 1535 | 804 |
| 27 | 2·319 | 696 | 3·864 | 1159 | 2·389 | 717 | 3·992 | 1198 | ·1444 | 10·26 | 1262 | 834 |
| 28 | 2·366 | 710 | 3·907 | 1172 | 2·435 | 731 | 4·031 | 1209 | ·1096 | 10·08 | 1027 | 856 |
| 29 | 2·415 | 725 | 3·950 | 1185 | 2·482 | 745 | 4·068 | 1220 | ·0742 | 9·89 | 828 | 871 |
| 30 | 2·464 | 739 | 3·990 | 1197 | 2·529 | 759 | 4·104 | 1231 | ·0385 | 9·70 | 659 | 877 |
| 31 | 2·512 | 754 | 4·028 | 1208 | 2·574 | 772 | 4·138 | 1241 | ·0022 | 9·50 | 517 | 879 |
| 32 | 2·559 | 768 | 4·065 | 1220 | 2·619 | 786 | 4·168 | 1250 | 2·9654 | 9·29 | 400 | 877 |
| 33 | 2·606 | 782 | 4·099 | 1230 | 2·663 | 799 | 4·197 | 1259 | ·9280 | 9·08 | 300 | 870 |
| 34 | 2·653 | 796 | 4·130 | 1239 | 2·707 | 812 | 4·222 | 1267 | ·8899 | 8·87 | 215 | 861 |
| 35 | 2·699 | 810 | 4·158 | 1247 | 2·749 | 825 | 4·246 | 1274 | ·8512 | 8·65 | 141 | 848 |
| 36 | 2·745 | 824 | 4·186 | 1256 | 2·792 | 838 | 4·270 | 1281 | ·8116 | 8·43 | 81 | 834 |
| 37 | 2·790 | 837 | 4·213 | 1264 | 2·835 | 851 | 4·291 | 1287 | ·7712 | 8·20 | 41 | 815 |
| 38 | 2·835 | 851 | 4·236 | 1271 | 2·878 | 863 | 4·311 | 1293 | ·7300 | 7·97 | 17 | 795 |
| 39 | 2·881 | 864 | 4·257 | 1277 | 2·922 | 877 | 4·330 | 1299 | ·6879 | 7·72 | 4 | 772 |
| 40 | 2·925 | 878 | 4·278 | 1283 | 2·966 | 890 | 4·347 | 1304 | ·6447 | 7·48 | ... | 748 |
| 41 | 2·968 | 890 | 4·295 | 1289 | 3·007 | 902 | 4·362 | 1309 | ·6004 | 7·23 | ... | 723 |
| 42 | 3·010 | 903 | 4·307 | 1292 | 3·048 | 914 | 4·374 | 1312 | ·5546 | 6·98 | ... | 698 |
| 43 | 3·050 | 915 | 4·316 | 1295 | 3·090 | 927 | 4·385 | 1316 | ·5073 | 6·73 | ... | 673 |
| 44 | 3·086 | 926 | 4·324 | 1297 | 3·130 | 939 | 4·395 | 1319 | ·4582 | 6·47 | ... | 647 |
| 45 | 3·126 | 938 | 4·332 | 1300 | 3·170 | 951 | 4·403 | 1321 | ·4074 | 6·22 | ... | 621 |
| 46 | 3·167 | 950 | 4·340 | 1302 | 3·210 | 963 | 4·412 | 1324 | ·3548 | 5·95 | ... | 595 |
| 47 | 3·209 | 963 | 4·349 | 1305 | 3·254 | 976 | 4·422 | 1327 | ·3002 | 5·68 | ... | 568 |
| 48 | 3·255 | 977 | 4·361 | 1308 | 3·304 | 991 | 4·436 | 1331 | ·2434 | 5·40 | ... | 540 |
| 49 | 3·309 | 993 | 4·380 | 1314 | 3·360 | 1008 | 4·457 | 1337 | ·1844 | 5·12 | ... | 512 |
| 50 | 3·364 | 1009 | 4·400 | 1320 | 3·418 | 1025 | 4·479 | 1344 | ·1227 | 4·82 | ... | 482 |
| 51 | 3·414 | 1024 | 4·412 | 1324 | 3·470 | 1041 | 4·493 | 1348 | ·0567 | 4·53 | ... | 453 |
| 52 | 3·459 | 1038 | 4·418 | 1325 | 3·517 | 1055 | 4·500 | 1350 | 1·9857 | 4·24 | ... | 424 |
| 53 | 3·498 | 1049 | 4·418 | 1325 | 3·559 | 1068 | 4·501 | 1350 | ·9091 | 3·97 | ... | 397 |
| 54 | 3·531 | 1059 | 4·412 | 1324 | 3·594 | 1078 | 4·496 | 1349 | ·8258 | 3·70 | ... | 370 |
| 55 | 3·559 | 1068 | 4·401 | 1320 | 3·624 | 1087 | 4·485 | 1346 | ·7363 | 3·43 | ... | 343 |
| 56 | 3·585 | 1076 | 4·387 | 1316 | 3·658 | 1097 | 4·471 | 1341 | ·6384 | 3·17 | ... | 317 |
| 57 | 3·610 | 1083 | 4·373 | 1312 | 3·680 | 1104 | 4·456 | 1337 | ·5315 | 2·92 | .. | 292 |
| 58 | 3·638 | 1091 | 4·359 | 1308 | 3·710 | 1113 | 4·444 | 1333 | ·4145 | 2·67 | ... | 267 |
| 59 | 3·675 | 1103 | 4·351 | 1305 | 3·750 | 1125 | 4·443 | 1333 | ·2859 | 2·42 | ... | 242 |
| 60 | 3·714 | 1114 | 4·347 | 1304 | 3·790 | 1137 | 4·443 | 1333 | ·1440 | 2·16 | ... | 216 |
| 61 | 3·747 | 1124 | 4·339 | 1302 | 3·825 | 1148 | 4·438 | 1331 | 0·9810 | 1·91 | ... | 191 |
| 62 | 3·776 | 1133 | 4·327 | 1298 | 3·856 | 1157 | 4·429 | 1329 | ·7916 | 1·68 | ... | 168 |
| 63 | 3·769 | 1131 | 4·277 | 1283 | 3·852 | 1156 | 4·381 | 1314 | ·5699 | 1·47 | ... | 147 |
| 64 | 3·743 | 1123 | 4·211 | 1263 | 3·827 | 1148 | 4·312 | 1294 | ·3077 | 1·27 | ... | 127 |
| 65 | 3·730 | 1119 | 4·160 | 1248 | 3·815 | 1145 | 4·260 | 1278 | 1·9931 | 1·09 | ... | 109 |
| 66 | 3·709 | 1113 | 4·100 | 1230 | 3·796 | 1139 | 4·203 | 1261 | ·6089 | ·92 | ... | 92 |
| 67 | 3·679 | 1104 | 4·034 | 1210 | 3·767 | 1130 | 4·139 | 1242 | ·1286 | ·77 | ... | 77 |
| 68 | 3·640 | 1092 | 3·961 | 1188 | 3·730 | 1119 | 4·063 | 1219 | 2·5006 | ·63 | ... | 63 |
| 69 | 3·617 | 1085 | 3·922 | 1177 | 3·709 | 1113 | 4·021 | 1206 | 3·6017 | ·50 | ... | 50 |

NOTE.—*See* Chapter III. and Chapter VII.

TABLE VI. (B)—*Showing the present value of a Reversionary Annuity to a Member's wife, and of the corresponding additional Subscriptions, on the assumption that the Member will leave a wife behind if he die in the first 40 years after entry, and will not re-marry if he live after that time. The data used are the same as in* TABLE VI. (A) (Appendix).

| Years completed from Entry. | Allowing for Reduction of Pension by Marriage. | | | | Not Allowing for Reduction of Pension by Marriage. | | | | Interest at 5 per cent. | | | | Years completed from Entry. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Interest at 3 per cent. | | Interest at 5 per cent. | | Interest at 3 per cent. | | Interest at 5 per cent. | | Log D (40 years Single life, afterwards Joint Lives.) | Annuity. | Value of 2 per cent. Subscriptions. | | |
| | Value of £1 Pension. | Value of £300 Pension | Value of £1 Pension. | Value of £300 Pension | Value of £1 Pension. | Value of £300 Pension | Value of £1 Pension. | Value of £300 Pension | | | Active. | Retired. | |
| | £ | £ | £ | £ | £ | £ | £ | £ | | | Rs. | Rs. | |
| 0 | 1·574 | 472 | 3·222 | 967 | 1·781 | 534 | 3·647 | 1094 | 4·0000 | 15·23 | 3292 | 182 | 0 |
| 1 | 1·609 | 483 | 3·273 | 982 | 1·816 | 545 | 3·693 | 1108 | 3·9744 | 15·13 | 3392 | 193 | 1 |
| 2 | 1·641 | 492 | 3·320 | 996 | 1·847 | 554 | 3·735 | 1121 | ·9485 | 15·02 | 3491 | 205 | 2 |
| 3 | 1·672 | 502 | 3·366 | 1010 | 1·876 | 563 | 3·774 | 1132 | ·9224 | 14·93 | 3589 | 218 | 3 |
| 4 | 1·705 | 512 | 3·413 | 1024 | 1·905 | 572 | 3·812 | 1144 | ·8961 | 14·82 | 3684 | 231 | 4 |
| 5 | 1·740 | 522 | 3·462 | 1039 | 1·938 | 581 | 3·853 | 1156 | ·8699 | 14·72 | 3772 | 246 | 5 |
| 6 | 1·777 | 533 | 3·511 | 1053 | 1·971 | 591 | 3·892 | 1168 | ·8436 | 14·60 | 3857 | 261 | 6 |
| 7 | 1·810 | 543 | 3·557 | 1067 | 2·000 | 600 | 3·926 | 1178 | ·8171 | 14·49 | 3937 | 278 | 7 |
| 8 | 1·841 | 552 | 3·598 | 1079 | 2·023 | 607 | 3·953 | 1186 | ·7903 | 14·39 | 4015 | 295 | 8 |
| 9 | 1·872 | 562 | 3·638 | 1091 | 2·046 | 614 | 3·977 | 1193 | ·7632 | 14·27 | 4091 | 314 | 9 |
| 10 | 1·903 | 571 | 3·679 | 1104 | 2·069 | 621 | 4·000 | 1200 | ·7361 | 14·17 | 4159 | 334 | 10 |
| 11 | 1·935 | 581 | 3·719 | 1116 | 2·091 | 627 | 4·021 | 1206 | ·7088 | 14·05 | 4216 | 356 | 11 |
| 12 | 1·966 | 590 | 3·758 | 1127 | 2·113 | 634 | 4·041 | 1212 | ·6814 | 13·94 | 4258 | 379 | 12 |
| 13 | 1·997 | 599 | 3·795 | 1139 | 2·135 | 641 | 4·061 | 1218 | ·6539 | 13·81 | 4284 | 404 | 13 |
| 14 | 2·028 | 608 | 3·829 | 1149 | 2·158 | 647 | 4·080 | 1224 | ·6263 | 13·68 | 4294 | 431 | 14 |
| 15 | 2·059 | 617 | 3·864 | 1159 | 2·183 | 655 | 4·100 | 1230 | ·5987 | 13·55 | 4279 | 459 | 15 |
| 16 | 2·092 | 628 | 3·899 | 1170 | 2·209 | 663 | 4·124 | 1237 | ·5709 | 13·41 | 4222 | 489 | 16 |
| 17 | 2·127 | 638 | 3·934 | 1180 | 2·238 | 671 | 4·148 | 1244 | ·5430 | 13·27 | 4122 | 522 | 17 |
| 18 | 2·163 | 649 | 3·971 | 1191 | 2·269 | 681 | 4·174 | 1252 | ·5151 | 13·12 | 3969 | 556 | 18 |
| 19 | 2·202 | 661 | 4·009 | 1203 | 2·302 | 691 | 4·202 | 1261 | ·4872 | 12·96 | 3775 | 593 | 19 |
| 20 | 2·242 | 673 | 4·050 | 1215 | 2·338 | 701 | 4·232 | 1270 | ·4593 | 12·78 | 3549 | 633 | 20 |
| 21 | 2·284 | 685 | 4·090 | 1227 | 2·377 | 713 | 4·263 | 1279 | ·4314 | 12·60 | 3291 | 675 | 21 |
| 22 | 2·328 | 698 | 4·129 | 1239 | 2·417 | 725 | 4·296 | 1289 | ·4033 | 12·41 | 2997 | 720 | 22 |
| 23 | 2·374 | 712 | 4·169 | 1251 | 2·459 | 738 | 4·329 | 1299 | ·3751 | 12·20 | 2666 | 768 | 23 |
| 24 | 2·420 | 726 | 4·207 | 1262 | 2·503 | 751 | 4·361 | 1308 | ·3467 | 11·99 | 2296 | 820 | 24 |
| 25 | 2·467 | 740 | 4·245 | 1274 | 2·547 | 764 | 4·393 | 1318 | ·3181 | 11·77 | 1924 | 869 | 25 |
| 26 | 2·514 | 754 | 4·280 | 1284 | 2·591 | 777 | 4·423 | 1327 | ·2892 | 11·55 | 1597 | 906 | 26 |
| 27 | 2·559 | 768 | 4·311 | 1293 | 2·635 | 791 | 4·449 | 1335 | ·2600 | 11·31 | 1312 | 933 | 27 |
| 28 | 2·602 | 781 | 4·339 | 1302 | 2·677 | 803 | 4·471 | 1341 | ·2305 | 11·08 | 1066 | 951 | 28 |
| 29 | 2·644 | 793 | 4·362 | 1309 | 2·716 | 815 | 4·489 | 1347 | ·2005 | 10·84 | 857 | 961 | 29 |
| 30 | 2·685 | 806 | 4·382 | 1315 | 2·754 | 826 | 4·504 | 1351 | ·1703 | 10·58 | 682 | 963 | 30 |
| 31 | 2·723 | 817 | 4·397 | 1319 | 2·790 | 837 | 4·513 | 1354 | ·1396 | 10·32 | 534 | 959 | 31 |
| 32 | 2·759 | 828 | 4·407 | 1322 | 2·823 | 847 | 4·517 | 1355 | ·1085 | 10·05 | 412 | 951 | 32 |
| 33 | 2·792 | 838 | 4·411 | 1323 | 2·854 | 856 | 4·514 | 1354 | ·0769 | 9·76 | 308 | 937 | 33 |
| 34 | 2·821 | 846 | 4·409 | 1323 | 2·880 | 864 | 4·507 | 1352 | ·0449 | 9·47 | 219 | 921 | 34 |
| 35 | 2·847 | 854 | 4·400 | 1320 | 2·901 | 870 | 4·492 | 1348 | ·0123 | 9·18 | 144 | 900 | 35 |
| 36 | 2·870 | 861 | 4·385 | 1316 | 2·919 | 876 | 4·471 | 1341 | 2·9791 | 8·87 | 83 | 877 | 36 |
| 37 | 2·887 | 866 | 4·362 | 1309 | 2·933 | 880 | 4·443 | 1333 | ·9453 | 8·54 | 41 | 849 | 37 |
| 38 | 2·898 | 869 | 4·331 | 1299 | 2·941 | 882 | 4·407 | 1322 | ·9109 | 8·20 | 17 | 819 | 38 |
| 39 | 2·903 | 871 | 4·292 | 1288 | 2·945 | 884 | 4·364 | 1309 | ·8758 | 7·85 | 4 | 784 | 39 |
| 40 | 2·926 | 878 | 4·277 | 1283 | 2·966 | 890 | 4·347 | 1304 | ·8401 | 7·48 | ... | 748 | 40 |
| 41 | 2·968 | 890 | 4·295 | 1289 | 3·007 | 902 | 4·362 | 1309 | ·7958 | 7·23 | ... | 723 | 41 |
| 42 | 3·010 | 903 | 4·307 | 1292 | 3·048 | 914 | 4·374 | 1312 | ·7500 | 6·98 | ... | 698 | 42 |
| 43 | 3·050 | 915 | 4·316 | 1295 | 3·090 | 927 | 4·385 | 1316 | ·7027 | 6·73 | ... | 673 | 43 |
| 44 | 3·086 | 926 | 4·324 | 1297 | 3·130 | 939 | 4·395 | 1319 | ·6536 | 6·47 | ... | 647 | 44 |
| 45 | 3·126 | 938 | 4·332 | 1300 | 3·170 | 951 | 4·403 | 1321 | ·6028 | 6·22 | ... | 621 | 45 |
| 46 | 3·167 | 950 | 4·340 | 1302 | 3·210 | 963 | 4·412 | 1324 | ·5502 | 5·95 | ... | 595 | 46 |
| 47 | 3·209 | 963 | 4·349 | 1305 | 3·254 | 976 | 4·422 | 1327 | ·4956 | 5·68 | ... | 568 | 47 |
| 48 | 3·255 | 977 | 4·361 | 1308 | 3·304 | 991 | 4·436 | 1331 | ·4388 | 5·40 | ... | 540 | 48 |
| 49 | 3·309 | 993 | 4·380 | 1314 | 3·360 | 1008 | 4·457 | 1337 | ·3798 | 5·12 | ... | 511 | 49 |
| 50 | 3·364 | 1009 | 4·400 | 1320 | 3·418 | 1025 | 4·479 | 1344 | ·3181 | 4·82 | ... | 482 | 50 |
| 51 | 3·414 | 1024 | 4·412 | 1324 | 3·470 | 1041 | 4·493 | 1348 | ·2521 | 4·53 | ... | 453 | 51 |
| 52 | 3·459 | 1038 | 4·418 | 1325 | 3·517 | 1055 | 4·500 | 1350 | ·1811 | 4·24 | ... | 424 | 52 |
| 53 | 3·498 | 1049 | 4·418 | 1325 | 3·559 | 1068 | 4·501 | 1350 | ·1045 | 3·97 | ... | 397 | 53 |
| 54 | 3·531 | 1059 | 4·412 | 1324 | 3·594 | 1078 | 4·496 | 1349 | ·0215 | 3·70 | ... | 370 | 54 |
| 55 | 3·559 | 1068 | 4·401 | 1320 | 3·624 | 1087 | 4·485 | 1346 | 1·9317 | 3·43 | ... | 343 | 55 |
| 56 | 3·585 | 1076 | 4·387 | 1316 | 3·658 | 1097 | 4·471 | 1341 | ·8338 | 3·17 | ... | 317 | 56 |
| 57 | 3·610 | 1083 | 4·373 | 1312 | 3·680 | 1104 | 4·456 | 1337 | ·7269 | 2·92 | ... | 292 | 57 |
| 58 | 3·638 | 1091 | 4·359 | 1308 | 3·710 | 1113 | 4·444 | 1333 | ·6099 | 2·67 | ... | 267 | 58 |
| 59 | 3·675 | 1103 | 4·351 | 1305 | 3·750 | 1125 | 4·443 | 1333 | ·4813 | 2·42 | ... | 242 | 59 |
| 60 | 3·714 | 1114 | 4·347 | 1304 | 3·790 | 1137 | 4·443 | 1333 | ·3394 | 2·16 | ... | 216 | 60 |
| 61 | 3·747 | 1124 | 4·339 | 1302 | 3·825 | 1148 | 4·438 | 1331 | ·1764 | 1·91 | ... | 191 | 61 |
| 62 | 3·776 | 1133 | 4·327 | 1298 | 3·856 | 1157 | 4·429 | 1329 | 0·9870 | 1·68 | ... | 168 | 62 |
| 63 | 3·769 | 1131 | 4·277 | 1283 | 3·852 | 1156 | 4·381 | 1314 | ·7653 | 1·47 | ... | 147 | 63 |
| 64 | 3·743 | 1123 | 4·211 | 1263 | 3·827 | 1148 | 4·312 | 1294 | ·5031 | 1·27 | ... | 127 | 64 |
| 65 | 3·730 | 1119 | 4·160 | 1248 | 3·815 | 1145 | 4·260 | 1278 | ·1885 | 1·09 | ... | 109 | 65 |
| 66 | 3·709 | 1113 | 4·100 | 1230 | 3·796 | 1139 | 4·203 | 1261 | $\bar{1}$·8043 | ·92 | ... | 92 | 66 |
| 67 | 3·679 | 1104 | 4·034 | 1210 | 3·767 | 1130 | 4·139 | 1242 | $\bar{1}$·3240 | ·77 | ... | 77 | 67 |
| 68 | 3·640 | 1092 | 3·961 | 1188 | 3·730 | 1119 | 4·063 | 1219 | $\bar{2}$·6960 | ·63 | ... | 63 | 68 |
| 69 | 3·617 | 1085 | 3·922 | 1177 | 3·709 | 1113 | 4·021 | 1206 | $\bar{3}$·7971 | ·50 | ... | 50 | 69 |

NOTE.—*See* Chapter III. and Chapter VII.

TABLE VII. —*Showing the Logarithms of the Ordinary and Additional Subscriptions used in the calculation of the value of Future Subscriptions, Ordinary and Additional, based on Active Service Salaries, and on Retiring Pensions, the latter being assumed to be* £1,000 *a-year.* (See TABLE C., Chapter VI.)

| Age. | Log Ordinary Subscription. | | Log Additional Subscription. | | Log Additional Subscription. | | Log Additional Subscription. | |
|---|---|---|---|---|---|---|---|---|
| | Active. 2½ per cent. | Retired. 1½ per cent. | Active. 2 per cent. | Retired. 1 per cent. | Active. ½ per cent. | Retired. ½ per cent. | Active. ½ per cent. | Retired. $\frac{1}{16}$ per cent. |
| 0 | 2·0792 | ... | 1·9823 | ... | 1·0792 | ... | 0·7782 | ... |
| 1 | ·1014 | ... | 2·0045 | ... | ·1014 | ... | ·8004 | ... |
| 2 | ·1370 | ... | ·0401 | ... | ·1370 | ... | ·8360 | ... |
| 3 | ·1761 | ... | ·0792 | ... | ·1761 | ... | ·8751 | ... |
| 4 | ·2135 | ... | ·1166 | ... | ·2135 | ... | ·9125 | ... |
| 5 | ·2487 | ... | ·1518 | ... | ·2487 | ... | ·9477 | ... |
| 6 | ·2792 | ... | ·1823 | ... | ·2792 | ... | ·9782 | ... |
| 7 | ·3077 | ... | ·2108 | ... | ·3077 | ... | 1·0067 | ... |
| 8 | ·3326 | ... | ·2357 | ... | ·3326 | ... | ·0316 | ... |
| 9 | ·3556 | ... | ·2587 | ... | ·3556 | ... | ·0546 | ... |
| 10 | ·3930 | ... | ·2961 | ... | ·3930 | ... | ·0920 | ... |
| 11 | ·4323 | ... | ·3354 | ... | ·4323 | ... | ·1313 | ... |
| 12 | ·4674 | ... | ·3705 | ... | ·4674 | ... | ·1664 | .. |
| 13 | ·5008 | ... | ·4039 | ... | ·5008 | ... | ·1998 | ... |
| 14 | ·5309 | ... | ·4340 | .. | ·5309 | ... | ·2299 | ... |
| 15 | ·5833 | ... | ·4864 | ... | ·5833 | ... | ·2823 | ... |
| 16 | ·6400 | ... | ·5431 | .. | ·6400 | ... | ·3390 | ... |
| 17 | ·6896 | ... | ·5927 | ... | ·6896 | • | ·3886 | ... |
| 18 | ·7341 | ... | ·6372 | ... | ·7341 | ... | ·4331 | ... |
| 19 | ·7520 | ... | ·6551 | ... | ·7520 | ... | ·4510 | ... |
| 20 | ·7689 | ... | ·6720 | ... | ·7689 | ... | ·4679 | ... |
| 21 | ·7855 | ... | ·6886 | ... | ·7855 | ... | ·4845 | ... |
| 22 | ·8012 | ... | ·7043 | ... | ·8012 | ... | ·5002 | ... |
| 23 | ·8164 | ... | ·7195 | ... | ·8164 | ... | ·5154 | ... |
| 24 | ·8312 | ... | ·7343 | ... | ·8312 | ... | ·5302 | ... |
| 25 | ·7746 | 1·2730 | ·6777 | 1·1761 | ·7746 | 0·2730 | ·4736 | 1·9720 |
| 26 | ·7104 | ·5593 | ·6135 | ·4624 | ·7104 | ·5593 | ·4094 | 0·2583 |
| 27 | ·6433 | ·7097 | ·5464 | ·6128 | ·6433 | ·7097 | ·3423 | ·4087 |
| 28 | ·5755 | ·8045 | ·4786 | ·7076 | ·5755 | ·8045 | ·2745 | ·5035 |
| 29 | ·4891 | ·8822 | ·3922 | ·7853 | ·4891 | ·8822 | ·1881 | ·5812 |
| 30 | ·4195 | ·9294 | ·3226 | ·8325 | ·4195 | ·9294 | ·1185 | ·6284 |
| 31 | ·3282 | ·9720 | ·2313 | ·8751 | ·3282 | ·9720 | ·0272 | ·6710 |
| 32 | ·2467 | 2·0000 | ·1498 | ·9031 | ·2467 | 1·0000 | 0·9457 | ·6990 |
| 33 | ·1642 | ·0212 | ·0673 | ·9243 | ·1642 | ·0212 | ·8632 | ·7202 |
| 34 | ·0883 | ·0364 | 1·0914 | ·9395 | ·0883 | ·0364 | ·7873 | ·7354 |
| 35 | ·0005 | ·0511 | ·9036 | ·9542 | ·0005 | ·0511 | ·6995 | ·7501 |
| 36 | 1·8590 | ·0654 | ·7621 | ·9685 | 0·8590 | ·0654 | ·5580 | ·7644 |
| 37 | ·6289 | ·0792 | ·5320 | ·9823 | ·6289 | ·0792 | ·3279 | ·7782 |
| 38 | ·3404 | ·0881 | ·2435 | ·9912 | ·3404 | ·0881 | ·0394 | ·7871 |
| 39 | ·0745 | ·0925 | 0·9776 | ·9956 | ·0745 | ·0925 | 1·7735 | ·7915 |
| 40 and upwrds. | ... | ·0969 | ... | 2·0000 | ... | ·0969 | ... | ·7959 |

TABLE VIII.—*Showing the present value of the Incumbent Pensions of £300 to Members' Widows payable quarterly in advance, the said Pensions being reducible to £150 a year in the event of re-marriage. The rate of mortality assumed is that used by Mr. Brown, and the rate of re-marriage the same as the rate of marriage among Daughters of Members, as deduced from the Experience of the Fund,* 1850-1872 *inclusive.*

| Age last Birthday. | Interest at 3 per cent. | | | | Interest at 5 per cent. | | | |
|---|---|---|---|---|---|---|---|---|
| | Value of Annuity to cease at death. | Value of Annuity to cease on re-marriage. | Value of Annuity reducible to one-half on re-marriage. | Value of Pension of £300 reducible to £150 on re-marriage. | Value of Annuity. | | | Value of Pension of £300 reducible to £150 on re-marriage. |
| | | | | | To cease at death. | To cease on re-marriage. | Reducible one-half on re-marriage. | |
| | | | | £ | | | | £ |
| 20 | 11·472 | 7·070 | 9·27 | 2781· | 16·24 | 9·197 | 12·72 | 3816· |
| 21 | 11·440 | 7·281 | 9·36 | 2808· | 16·17 | 9·526 | 12·85 | 3855· |
| 22 | 11·408 | 7·492 | 9·45 | 2835· | 16·09 | 9·853 | 12·97 | 3891· |
| 23 | 11·375 | 7·708 | 9·54 | 2862· | 16·00 | 10·184 | 13·09 | 3927· |
| 24 | 11·341 | 7·931 | 9·64 | 2892· | 15·92 | 10·524 | 13·22 | 3966· |
| 25 | 11·307 | 8·158 | 9·73 | 2919· | 15·84 | 10·866 | 13·35 | 4005· |
| 26 | 11·272 | 8·388 | 9·83 | 2949· | 15·75 | 11·206 | 13·48 | 4044· |
| 27 | 11·236 | 8·607 | 9·92 | 2976· | 15·66 | 11·528 | 13·59 | 4077· |
| 28 | 11·199 | 8·799 | 10·00 | 3000· | 15·57 | 11·808 | 13·69 | 4107· |
| 29 | 11·161 | 8·961 | 10·06 | 3018· | 15·47 | 12·044 | 13·76 | 4128· |
| 30 | 11·121 | 9·104 | 10·11 | 3033· | 15·38 | 12·249 | 13·81 | 4143· |
| 31 | 11·080 | 9·232 | 10·16 | 3048· | 15·28 | 12·430 | 13·86 | 4158· |
| 32 | 11·039 | 9·350 | 10·19 | 3057· | 15·18 | 12·592 | 13·89 | 4167· |
| 33 | 10·995 | 9·459 | 10·23 | 3069· | 15·07 | 12·739 | 13·90 | 4170· |
| 34 | 10·948 | 9·563 | 10·26 | 3078· | 14·97 | 12·874 | 13·92 | 4176· |
| 35 | 10·899 | 9·660 | 10·28 | 3084· | 14·86 | 12·997 | 13·93 | 4179· |
| 36 | 10·848 | 9·752 | 10·30 | 3090· | 14·74 | 13·106 | 13·92 | 4176· |
| 37 | 10·795 | 9·835 | 10·32 | 3096· | 14·62 | 13·200 | 13·91 | 4173· |
| 38 | 10·738 | 9·908 | 10·32 | 3096· | 14·49 | 13·275 | 13·88 | 4164· |
| 39 | 10·676 | 9·968 | 10·32 | 3096· | 14·35 | 13·328 | 13·84 | 4152· |
| 40 | 10·610 | 10·015 | 10·31 | 3093· | 14·22 | 13·359 | 13·79 | 4137· |
| 41 | 10·540 | 10·049 | 10·29 | 3087· | 14·07 | 13·368 | 13·72 | 4116· |
| 42 | 10·466 | 10·061 | 10·26 | 3078· | 13·92 | 13·346 | 13·63 | 4089· |
| 43 | 10·387 | 10·057 | 10·22 | 3066· | 13·76 | 13·297 | 13·53 | 4059· |
| 44 | 10·303 | 10·048 | 10·18 | 3054· | 13·60 | 13·239 | 13·42 | 4026· |
| 45 | 10·214 | 10·035 | 10·12 | 3036· | 13·42 | 13·173 | 13·30 | 3990· |
| 46 | 10·120 | 10·001 | 10·06 | 3018· | 13·24 | 13·079 | 13·16 | 3948· |
| 47 | 10·021 | 9·948 | 9·98 | 2994· | 13·05 | 12·955 | 13·00 | 3900· |
| 48 | 9·915 | 9·882 | 9·90 | 2970· | 12·85 | 12·814 | 12·83 | 3849· |
| 49 | 9·803 | 9·799 | 9·80 | 2940· | 12·65 | 12·650 | 12·65 | 3795· |
| 50 | 9·687 | 9·693 | 9·69 | 2907· | 12·46 | 12·456 | 12·46 | 3738· |
| 51 | 9·566 | ... | 9·57 | 2871· | 12·23 | ... | 12·24 | 3672· |
| 52 | 9·431 | ... | 9·43 | 2829· | 12·01 | ... | 12·01 | 3603· |
| 53 | 9·296 | ... | 9·30 | 2790· | 11·78 | ... | 11·78 | 3534· |
| 54 | 9·155 | ... | 9·16 | 2748· | 11·54 | ... | 11·54 | 3462· |
| 55 | 9·008 | ... | 9·01 | 2703· | 11·30 | ... | 11·30 | 3390· |
| 56 | 8·858 | ... | 8·86 | 2658· | 11·05 | ... | 11·05 | 3315· |
| 57 | 8·701 | ... | 8·70 | 2610· | 10·80 | ... | 10·80 | 3240· |
| 58 | 8·539 | ... | 8·54 | 2562· | 10·55 | ... | 10·55 | 3165· |
| 59 | 8·372 | ... | 8·37 | 2511· | 10·29 | ... | 10·29 | 3087· |
| 60 | 8·200 | ... | 8·20 | 2460· | 10·02 | ... | 10·02 | 3006· |
| 61 | 8·021 | ... | 8·02 | 2406· | 9·745 | ... | 9·75 | 2925· |
| 62 | 7·835 | ... | 7·84 | 2352· | 9·468 | ... | 9·47 | 2841· |
| 63 | 7·645 | ... | 7·65 | 2295· | 9·188 | ... | 9·19 | 2757· |
| 64 | 7·451 | ... | 7·45 | 2235· | 8·905 | ... | 8·91 | 2673· |
| 65 | 7·253 | ... | 7·25 | 2175· | 8·621 | ... | 8·62 | 2586· |
| 66 | 7·053 | ... | 7·05 | 2115· | 8·337 | ... | 8·34 | 2502· |
| 67 | 6·850 | ... | 6·85 | 2055. | 8·053 | ... | 8·05 | 2415· |
| 68 | 6·644 | ... | 6·64 | 1992· | 7·768 | ... | 7·77 | 2331· |
| 69 | 6·435 | ... | 6·44 | 1932· | 7·483 | ... | 7·48 | 2244· |
| 70 | 6·227 | ... | 6·23 | 1869· | 7·199 | ... | 7·20 | 2160· |
| 71 | 6·016 | .. | 6·02 | 1806· | 6·917 | ... | 6·92 | 2076· |
| 72 | 5·804 | ... | 5·80 | 1740· | 6·677 | ... | 6·68 | 2004· |
| 73 | 5·593 | ... | 5·59 | 1677· | 6·407 | ... | 6·41 | 1923· |
| 74 | 5·383 | ... | 5·38 | 1614· | 6·102 | ... | 6·10 | 1830· |
| 75 | 5·175 | ... | 5·18 | 1554· | 5·836 | ... | 5·84 | 1752· |
| 76 | 4·968 | ... | 4·97 | 1491· | 5·574 | ... | 5·57 | 1671· |
| 77 | 4·764 | ... | 4·76 | 1428· | 5·318 | ... | 5·32 | 1596· |
| 78 | 4·562 | ... | 4·56 | 1368· | 5·069 | ... | 5·07 | 1521· |
| 79 | 4·367 | ... | 4·37 | 1311· | 4·827 | ... | 4·83 | 1449· |
| 80 | 4·174 | ... | 4·17 | 1251· | 4·592 | ... | 4·59 | 1377· |
| 81 | 3·985 | ... | 3·99 | 1197· | 4·363 | ... | 4·36 | 1308· |
| 82 | 3·800 | ... | 3·80 | 1140· | 4·140 | ... | 4·14 | 1242· |
| 83 | 3·617 | ... | 3·62 | 1086· | 3·922 | ... | 3·92 | 1176· |
| 84 | 3·436 | ... | 3·44 | 1032· | 3·708 | ... | 3·71 | 1113· |
| 85 | 3·257 | ... | 3·26 | 978· | 3·498 | ... | 3·50 | 1050· |
| 86 | 3·079 | ... | 3·08 | 924· | 3·291 | ... | 3·29 | 987· |
| 87 | 2·897 | ... | 2·90 | 870· | 3·080 | ... | 3·08 | 924· |
| 88 | 2·708 | ... | 2·71 | 813· | 2·864 | ... | 2·86 | 858· |
| 89 | 2·505 | ... | 2·51 | 753· | 2·633 | ... | 2·63 | 789· |
| 90 | 2·274 | ... | 2·27 | 681· | 2·375 | ... | 2·38 | 714· |
| 91 | 2·013 | ... | 2·01 | 603· | 2·089 | ... | 2·09 | 627· |
| 92 | 1·727 | ... | 1·73 | 519· | 1·781 | ... | 1·78 | 534· |
| 93 | 1·464 | ... | 1·46 | 438· | 1·501 | ... | 1·50 | 450· |
| 94 | 1·241 | ... | 1·24 | 372· | 1·264 | ... | 1·26 | 378· |
| 95 | ·994 | ... | ·99 | 297· | 1·006 | ... | 1·01 | 303· |
| 96 | ·428 | ... | ·43 | 129· | ·744 | ... | ·74 | 222· |

TABLE IX.—*Giving the values of Contingent Reversionary Benefits to the Sons of Members in the event of their becoming fatherless, at 8 per cent. interest and 5 per cent. interest respectively; together with the value of the Additional Subscription payable by the Father at 5 per cent. interest.*

**Born in year following 0 years from Entry.**

| Age of Son last Birthday. | Value of Son's Benefit. | | Interest at 5 per cent. | | | |
|---|---|---|---|---|---|---|
| | 8 per cent. Interest. | 5 per cent. Interest. | Joint Life, log D. | Value of Joint Life Annuity (until Son attains 21). *(See Chap. VII.)* | Value of Subscription (until Son attains 21). | |
| | | | | | In Active Service. | Retired. |
| | £ | £ | | | Rs. | Rs. |
| 0 | 70· | 101· | 4·0000 | 9·79 | 127 | |
| 1 | 75· | 104· | 3·9374 | 10·12 | 140 | |
| 2 | 76· | 104· | ·8885 | 10·13 | 150 | |
| 3 | 75· | 101· | ·8551 | 9·92 | 154 | |
| 4 | 74· | 97· | ·8234 | 9·65 | 158 | |
| 5 | 72· | 92· | ·7937 | 9·33 | 160 | |
| 6 | 68· | 87· | ·7643 | 8·98 | 162 | |
| 7 | 64· | 80· | ·7350 | 8·60 | 163 | |
| 8 | 59· | 72· | ·7061 | 8·19 | 163 | |
| 9 | 54· | 65· | ·6776 | 7·74 | 163 | |
| 10 | 48· | 57· | ·6490 | 7·27 | 162 | |
| 11 | 42· | 48· | ·6202 | 6·77 | 160 | |
| 12 | 35· | 41· | ·5912 | 6·24 | 156 | |
| 13 | 29· | 33· | ·5621 | 5·67 | 151 | |
| 14 | 23· | 26· | ·5329 | 5·07 | 145 | |
| 15 | 18· | 19· | ·5036 | 4·42 | 136 | |
| 16 | 13· | 14· | ·4741 | 3·73 | 124 | |
| 17 | 8· | 9· | ·4445 | 3·00 | 109 | |
| 18 | 5· | 5· | ·4147 | 2·21 | 90 | |
| 19 | 2· | 2· | ·3848 | 1·37 | 68 | |
| 20 | ·39 | ·40 | ·3546 | ·47 | 43 | |

TABLE IX. (continued).—*Giving the values of Contingent Reversionary Benefits to the Sons of Members in the event of their becoming fatherless, at 8 per cent. interest and 5 per cent. interest respectively; together with the value of the Additional Subscription payable by the Father at 5 per cent. interest.*

**Born in year following 5 years from Entry.**

| Age of Son last Birthday. | Value of Son's Benefit. | | Interest at 5 per cent. | | | |
|---|---|---|---|---|---|---|
| | 8 per cent. Interest. | 5 per cent. Interest. | Joint Life, log D. | Value of Joint Life Annuity (until Son attains 21). *(See Chap. VII.)* | Value of Subscription (until Son attains 21). | |
| | | | | | In Active Service. | Retired. |
| | £ | £ | | | Rs. | Rs. |
| 0 | 78· | 111· | 4·0000 | 9·65 | 180 | 1 |
| 1 | 82· | 115· | 3·9364 | 9·99 | 195 | 1 |
| 2 | 84· | 114· | ·8867 | 10·01 | 204 | 1 |
| 3 | 82· | 111· | ·8524 | 9·81 | 209 | 1 |
| 4 | 80· | 105· | ·8198 | 9·56 | 213 | 1 |
| 5 | 77· | 101· | ·7890 | 9·25 | 216 | 1 |
| 6 | 73· | 94· | ·7587 | 8·92 | 217 | 1 |
| 7 | 68· | 85· | ·7287 | 8·55 | 217 | 1 |
| 8 | 62· | 76· | ·6993 | 8·14 | 216 | 1 |
| 9 | 56· | 68· | ·6703 | 7·71 | 213 | 1 |
| 10 | 50· | 59· | ·6412 | 7·24 | 207 | 1 |
| 11 | 44· | 51· | ·6120 | 6·74 | 198 | 1 |
| 12 | 37· | 43· | ·5827 | 6·22 | 186 | 2 |
| 13 | 31· | 35· | ·5533 | 5·65 | 172 | 2 |
| 14 | 25· | 28· | ·5239 | 5·05 | 155 | 2 |
| 15 | 19· | 21· | ·4944 | 4·41 | 136 | 2 |
| 16 | 14· | 15· | ·4646 | 3·72 | 115 | 2 |
| 17 | 9· | 10· | ·4346 | 2·90 | 91 | 2 |
| 18 | 5· | 5· | ·4043 | 2·20 | 64 | 2 |
| 19 | 2· | 2· | ·3737 | 1·36 | 37 | 2 |
| 20 | ·44 | ·45 | ·3427 | ·47 | 12 | 1 |

TABLE IX. (continued).—*Giving the values of Contingent Reversionary Benefits to the Sons of Members in the event of their becoming fatherless, at* 8 *per cent. interest and* 5 *per cent. interest respectively; together with the value of the Additional Subscription payable by the Father at* 5 *per cent. interest.*

**Born in year following 10 years from Entry.**

| Age of Son last Birthday. | Value of Son's Benefit. | | Interest at 5 per cent. | | | |
|---|---|---|---|---|---|---|
| | 8 per cent. Interest. | 5 per cent. Interest. | Joint Life, log D. | Value of Joint Life Annuity (until Son attains 21). *(See Chap. VII.)* | Value of Subscription (until Son attains 21). | |
| | | | | | In Active Service. | Retired. |
| | £ | £ | | | Rs. | Rs. |
| 0 | 84· | 119· | 4·0000 | 9·55 | 214 | 5 |
| 1 | 88· | 123· | 3·9354 | 9·90 | 230 | 6 |
| 2 | 89· | 122· | ·8850 | 9·92 | 238 | 7 |
| 3 | 88· | 118· | ·8502 | 9·73 | 241 | 7 |
| 4 | 86· | 113· | ·8171 | 9·48 | 241 | 8 |
| 5 | 82· | 106· | ·7859 | 9·18 | 239 | 8 |
| 6 | 78· | 99· | ·7552 | 8·84 | 233 | 9 |
| 7 | 73· | 91· | ·7249 | 8·48 | 224 | 10 |
| 8 | 67· | 83· | ·6952 | 8·07 | 212 | 10 |
| 9 | 62· | 74· | ·6659 | 7·64 | 198 | 11 |
| 10 | 55· | 66· | ·6365 | 7·17 | 182 | 12 |
| 11 | 49· | 57· | ·6070 | 6·68 | 163 | 13 |
| 12 | 42· | 49· | ·5773 | 6·15 | 143 | 14 |
| 13 | 36· | 40· | ·5474 | 5·59 | 120 | 15 |
| 14 | 29· | 32· | ·5172 | 4·99 | 97 | 15 |
| 15 | 23· | 25· | ·4868 | 4·36 | 76 | 15 |
| 16 | 17· | 18· | ·4559 | 3·68 | 58 | 14 |
| 17 | 11· | 12· | ·4246 | 2·96 | 42 | 12 |
| 18 | 6· | 6· | ·3928 | 2·19 | 28 | 9 |
| 19 | 3· | 3· | ·3606 | 1·36 | 16 | 6 |
| 20 | ·55 | ·56 | ·3278 | ·46 | 5 | 2 |

TABLE IX. (continued).—*Giving the value of Contingent Reversionary Benefits to the Sons of Members in the event of their becoming fatherless, at* 8 *per cent. interest and* 5 *per cent. interest respectively; together with the value of the Additional Subscription payable by the Father at* 5 *per cent. interest.*

**Born in year following 15 years from Entry.**

| Age of Son last Birthday. | Value of Son's Benefit. | | Interest at 5 per cent. | | | |
|---|---|---|---|---|---|---|
| | 8 per cent. Interest. | 5 per cent. Interest. | Joint Life, log D. | Value of Joint Life Annuity (until Son attains 21). *(See Chap. VII.)* | Value of Subscription (until Son attains 21). | |
| | | | | | In Active Service. | Retired. |
| | £ | £ | | | Rs. | Rs. |
| 0 | 91· | 130· | 4·0000 | 9·43 | 222 | 14 |
| 1 | 96· | 135· | 3·9350 | 9·77 | 230 | 16 |
| 2 | 98· | 135· | ·8842 | 9·79 | 228 | 18 |
| 3 | 97· | 131· | ·8491 | 9·59 | 219 | 19 |
| 4 | 96· | 126· | ·8157 | 9·33 | 208 | 20 |
| 5 | 93· | 120· | ·7842 | 9·03 | 193 | 22 |
| 6 | 89· | 113· | ·7532 | 8·69 | 176 | 24 |
| 7 | 84· | 106· | ·7225 | 8·32 | 157 | 25 |
| 8 | 79· | 97· | ·6923 | 7·92 | 135 | 27 |
| 9 | 73· | 88· | ·6623 | 7·49 | 113 | 29 |
| 10 | 67· | 79· | ·6321 | 7·03 | 93 | 29 |
| 11 | 59· | 69· | ·6015 | 6·55 | 76 | 29 |
| 12 | 52· | 59· | ·5706 | 6·04 | 61 | 29 |
| 13 | 44· | 50· | ·5392 | 5·49 | 49 | 27 |
| 14 | 36· | 40· | ·5074 | 4·91 | 38 | 25 |
| 15 | 28· | 31· | ·4752 | 4·29 | 29 | 23 |
| 16 | 21· | 22· | ·4424 | 3·63 | 22 | 20 |
| 17 | 14· | 15· | ·4090 | 2·92 | 16 | 16 |
| 18 | 8· | 8· | ·3750 | 2·16 | 10 | 12 |
| 19 | 3· | 3· | ·3404 | 1·35 | 6 | 8 |
| 20 | ·69 | ·70 | ·3050 | ·46 | 2 | 3 |

TABLE IX. (continued).—*Giving the values of Contingent Reversionary Benefits to the Sons of Members in the event of their becoming fatherless, at 8 per cent. interest and 5 per cent. interest respectively; together with the value of the Additional Subscription payable by the Father at 5 per cent. interest.*

**Born in year following 20 years from Entry.**

| Age of Son last Birthday. | Value of Son's Benefit. | | Interest at 5 per cent. | | | |
|---|---|---|---|---|---|---|
| | 8 per cent. Interest. | 5 per cent. Interest. | Joint Life, log D. | Value of Joint Life Annuity (until Son attains 21). *(See Chap. VII.)* | Value of Subscription (until Son attains 21). | |
| | | | | | In Active Service. | Retired. |
| | £ | £ | | | Rs. | Rs. |
| 0 | 105· | 150· | 4·0000 | 9·21 | 175 | 26 |
| 1 | 112· | 157· | 3·9347 | 9·53 | 169 | 30 |
| 2 | 115· | 158· | ·8835 | 9·53 | 155 | 33 |
| 3 | 115· | 155· | ·8479 | 9·33 | 134 | 36 |
| 4 | 114· | 151· | ·8138 | 9·07 | 113 | 38 |
| 5 | 112· | 145· | ·7814 | 8·77 | 94 | 40 |
| 6 | 108· | 137· | ·7493 | 8·44 | 78 | 41 |
| 7 | 103· | 129· | ·7173 | 8·08 | 63 | 41 |
| 8 | 97· | 119· | ·6855 | 7·69 | 51 | 41 |
| 9 | 90· | 109· | ·6539 | 7·28 | 40 | 40 |
| 10 | 82· | 98· | ·6219 | 6·84 | 32 | 38 |
| 11 | 74· | 86· | ·5894 | 6·37 | 24 | 37 |
| 12 | 64· | 74· | ·5564 | 5·88 | 18 | 34 |
| 13 | 55· | 62· | ·5228 | 5·36 | 13 | 32 |
| 14 | 45· | 50· | ·4886 | 4·80 | 8 | 29 |
| 15 | 35· | 39· | ·4539 | 4·20 | 5 | 26 |
| 16 | 26· | 28· | ·4184 | 3·56 | 2 | 22 |
| 17 | 17· | 18· | ·3822 | 2·88 | 1 | 18 |
| 18 | 10· | 10· | ·3458 | 2·13 | ... | 13 |
| 19 | 4· | 4· | ·3076 | 1·33 | ... | 8 |
| 20 | ·90 | ·91 | ·2688 | ·46 | ... | 3 |

TABLE IX. (continued)—*Giving the values of Contingent Reversionary Benefits to the Sons of Members in the event of their becoming fatherless, at 8 per cent. interest and 5 per cent. interest respectively; together with the value of the Additional Subscription payable by the Father at 5 per cent. interest.*

**Born in year following 25 years from Entry.**

| Age of Son last Birthday. | Value of Son's Benefit. | | Interest at 5 per cent. | | | |
|---|---|---|---|---|---|---|
| | 8 per cent. Interest. | 5 per cent. Interest. | Joint Life, log D. | Value of Joint Life Annuity (until Son attains 21). *(See Chap. VII.)* | Value of Subscription (until Son attains 21). | |
| | | | | | In Active Service. | Retired. |
| | £ | £ | | | Rs. | Rs. |
| 0 | 126· | 181· | 4·0000 | 8·85 | 85 | 42 |
| 1 | 136· | 190· | 3·9335 | 9·15 | 74 | 46 |
| 2 | 140· | 193· | ·8810 | 9·15 | 62 | 48 |
| 3 | 141· | 190· | ·8438 | 8·95 | 50 | 49 |
| 4 | 140· | 185· | ·8081 | 8·70 | 40 | 49 |
| 5 | 138· | 179· | ·7739 | 8·41 | 31 | 48 |
| 6 | 134· | 170· | ·7399 | 8·09 | 24 | 47 |
| 7 | 128· | 160· | ·7058 | 7·75 | 18 | 46 |
| 8 | 121· | 149· | ·6719 | 7·38 | 13 | 45 |
| 9 | 113· | 136· | ·6379 | 6·99 | 8 | 43 |
| 10 | 104· | 123· | ·6033 | 6·57 | 5 | 41 |
| 11 | 93· | 109· | ·5681 | 6·13 | 2 | 38 |
| 12 | 82· | 94· | ·5323 | 5·66 | 1 | 35 |
| 13 | 70· | 79· | ·4958 | 5·17 | ... | 32 |
| 14 | 59· | 65· | ·4585 | 4·63 | ... | 29 |
| 15 | 47· | 51· | ·4203 | 4·07 | ... | 25 |
| 16 | 35· | 37· | ·3810 | 3·46 | ... | 22 |
| 17 | 23· | 25· | ·3405 | 2·80 | ... | 17 |
| 18 | 13· | 14· | ·2988 | 2·09 | ... | 13 |
| 19 | 6· | 6· | ·2557 | 1·31 | ... | 8 |
| 20 | 1·22 | 1·24 | ·2112 | ·45 | ... | 3 |

TABLE IX. (continued).—*Giving the values of Contingent Reversionary Benefits to the Sons of Members in the event of their becoming fatherless, at 8 per cent. interest and 5 per cent. interest respectively; together with the value of the Additional Subscription payable by the Father at 5 per cent. interest.*

**Born in year following 30 years from Entry.**

| Age of Son last Birthday. | Value of Son's Benefit. | | Interest at 5 per cent. | | | |
|---|---|---|---|---|---|---|
| | 8 per cent. Interest. | 5 per cent. Interest. | Joint Life, log D. | Value of Joint Life Annuity (until Son attains 21). *(See Chap. VII.)* | Value of Subscription (until Son attains 21). | |
| | | | | | In Active Service. | Retired. |
| | £ | £ | | | Rs. | Rs. |
| 0 | 155· | 222· | 4·0000 | 8·37 | 29 | 48 |
| 1 | 168· | 235· | 3·9314 | 8·64 | 23 | 51 |
| 2 | 174· | 239· | ·8767 | 8·63 | 18 | 52 |
| 3 | 176· | 237· | ·8373 | 8·44 | 13 | 51 |
| 4 | 175· | 232· | ·7992 | 8·20 | 8 | 50 |
| 5 | 173· | 224· | ·7624 | 7·92 | 5 | 49 |
| 6 | 169· | 215· | ·7257 | 7·62 | 2 | 47 |
| 7 | 163· | 203· | ·6888 | 7·30 | 1 | 45 |
| 8 | 155· | 190· | ·6519 | 6·95 | ... | 43 |
| 9 | 146· | 176· | ·6148 | 6·57 | ... | 41 |
| 10 | 135· | 160· | ·5768 | 6·18 | ... | 39 |
| 11 | 122· | 143· | ·5378 | 5·77 | ... | 36 |
| 12 | 108· | 124· | ·4976 | 5·34 | ... | 33 |
| 13 | 94· | 106· | ·4563 | 4·88 | ... | 31 |
| 14 | 78· | 87· | ·4137 | 4·39 | ... | 27 |
| 15 | 63· | 68· | ·3698 | 3·87 | ... | 24 |
| 16 | 47· | 50· | ·3244 | 3·30 | ... | 21 |
| 17 | 32· | 34· | ·2774 | 2·69 | ... | 17 |
| 18 | 19· | 20· | ·2287 | 2·01 | ... | 13 |
| 19 | 8·3 | 8·4 | ·1783 | 1·27 | ... | 8 |
| 20 | 1·85 | 1·87 | ·1243 | ·44 | ... | 3 |

TABLE IX. (continued).—*Giving the values of Contingent Reversionary Benefits to the Sons of Members in the event of their becoming fatherless, at 8 per cent. interest and 5 per cent. interest respectively; together with the value of the Additional Subscription payable by the Father at 5 per cent. interest.*

**Born in year following 35 years from Entry.**

| Age of Son last Birthday. | Value of Son's Benefit. | | Interest at 5 per cent. | | | |
|---|---|---|---|---|---|---|
| | 8 per cent. Interest. | 5 per cent. Interest. | Joint Life, log D. | Value of Joint Life Annuity (until Son attains 21). *(See Chap. VII.)* | Value of Subscription (until Son attains 21). | |
| | | | | | In Active Service. | Retired. |
| | £ | £ | | | Rs. | Rs. |
| 0 | 195· | 279· | 4·0000 | 7·71 | 4 | 48 |
| 1 | 212· | 297· | 3·9285 | 7·94 | 2 | 49 |
| 2 | 221· | 304· | ·8709 | 7·91 | 1 | 49 |
| 3 | 225· | 303· | ·8285 | 7·71 | ... | 48 |
| 4 | 227· | 299· | ·7873 | 7·47 | ... | 47 |
| 5 | 225· | 292· | ·7471 | 7·20 | ... | 45 |
| 6 | 222· | 282· | ·7065 | 6·91 | ... | 43 |
| 7 | 216· | 270· | ·6658 | 6·60 | ... | 41 |
| 8 | 208· | 255· | ·6236 | 6·27 | ... | 39 |
| 9 | 197· | 238· | ·5812 | 5·93 | ... | 37 |
| 10 | 184· | 219· | ·5375 | 5·57 | ... | 35 |
| 11 | 170· | 198· | ·4924 | 5·18 | ... | 32 |
| 12 | 154· | 176· | ·4458 | 4·78 | ... | 30 |
| 13 | 137· | 154· | ·3975 | 4·36 | ... | 27 |
| 14 | 118· | 131· | ·3475 | 3·90 | ... | 24 |
| 15 | 98· | 107· | ·2941 | 3·43 | ... | 21 |
| 16 | 76· | 82· | ·2367 | 2·94 | ... | 18 |
| 17 | 54· | 57· | ·1748 | 2·41 | ... | 15 |
| 18 | 33· | 34· | ·1079 | 1·82 | ... | 11 |
| 19 | 14·4 | 14·7 | ·0353 | 1·17 | ... | 7 |
| 20 | 3·27 | 3·36 | 2·9561 | ·41 | ... | 3 |

TABLE IX. (continued).—*Giving the values of Contingent Reversionary Benefits to the Sons of Members in the event of their becoming fatherless, at 8 per cent. interest and 5 per cent. interest respectively; together with the value of the Additional Subscription payable by the Father at 5 per cent. interest.*

**Born in year following 40 years from Entry.**

| Age of Son last Birthday. | Value of Son's Benefit. | | Interest at 5 per cent. | | | |
|---|---|---|---|---|---|---|
| | 8 per cent. Interest. | 5 per cent. Interest. | Joint Life, log D. | Value of Joint Life Annuity (until Son attains 21). *(See Chap. VII.)* | Value of Subscription (until Son attains 21). | |
| | | | | | In Active Service. | Retired. |
| | £ | £ | | | Rs. | Rs. |
| 0 | 252· | 360· | 4·0000 | 6·78 | ... | 42 |
| 1 | 276· | 386· | 3·9243 | 6·95 | ... | 43 |
| 2 | 291· | 399· | ·8621 | 6·88 | ... | 43 |
| 3 | 299· | 402· | ·8149 | 6·67 | ... | 42 |
| 4 | 303· | 400· | ·7683 | 6·42 | ... | 40 |
| 5 | 305· | 395· | ·7224 | 6·14 | ... | 38 |
| 6 | 305· | 387· | ·6757 | 5·84 | ... | 37 |
| 7 | 302· | 377· | ·6280 | 5·53 | ... | 35 |
| 8 | 296· | 363· | ·5794 | 5·19 | ... | 32 |
| 9 | 288· | 347· | ·5296 | 4·84 | ... | 30 |
| 10 | 276· | 326· | ·4764 | 4·50 | ... | 28 |
| 11 | 260· | 302· | ·4193 | 4·15 | ... | 26 |
| 12 | 240· | 274· | ·3578 | 3·81 | ... | 24 |
| 13 | 216· | 243· | ·2913 | 3·45 | ... | 22 |
| 14 | 188· | 208· | ·2241 | 3·08 | ... | 19 |
| 15 | 158· | 172· | ·1456 | 2·71 | ... | 17 |
| 16 | 125· | 134· | ·0597 | 2·34 | ... | 15 |
| 17 | 91· | 96· | 2·9654 | 1·93 | ... | 12 |
| 18 | 57· | 59· | ·8615 | 1·49 | ... | 9 |
| 19 | 26·8 | 27·4 | ·7467 | ·97 | ... | 6 |
| 20 | 6·41 | 6·48 | ·6128 | ·35 | ... | 2 |

TABLE IX. (continued).—*Giving the values of Contingent Reversionary Benefits to the Sons of Members in the event of their becoming fatherless, at 8 per cent. interest and 5 per cent. interest respectively; together with the value of the Additional Subscription payable by the Father at 5 per cent. interest.*

**Born in year following 45 years from Entry.**

| Age of Son last Birthday. | Value of Son's Benefit. | | Interest at 5 per cent. | | | |
|---|---|---|---|---|---|---|
| | 8 per cent. Interest. | 5 per cent. Interest. | Joint Life, log D. | Value of Joint Life Annuity (until Son attains 21). *(See Chap. VII.)* | Value of Subscription (until Son attains 21). | |
| | | | | | In Active Service. | Retired. |
| | £ | £ | | | Rs. | Rs. |
| 0 | 328· | 463· | 4·0000 | 5·56 | ... | 35 |
| 1 | 362· | 501· | 3·9177 | 5·62 | ... | 35 |
| 2 | 386· | 523· | ·8487 | 5·48 | ... | 34 |
| 3 | 403· | 534· | ·7944 | 5·21 | ... | 33 |
| 4 | 415· | 540· | ·7403 | 4·91 | ... | 31 |
| 5 | 424· | 540· | ·6848 | 4·59 | ... | 29 |
| 6 | 429· | 535· | ·6261 | 4·28 | ... | 27 |
| 7 | 430· | 526· | ·5635 | 3·97 | ... | 25 |
| 8 | 426· | 511· | ·4967 | 3·66 | ... | 23 |
| 9 | 418· | 492· | ·4248 | 3·34 | ... | 21 |
| 10 | 406· | 467· | ·3465 | 3·04 | ... | 19 |
| 11 | 389· | 438· | ·2609 | 2·73 | ... | 17 |
| 12 | 368· | 405· | ·1670 | 2·43 | ... | 15 |
| 13 | 337· | 369· | ·0636 | 2·11 | ... | 13 |
| 14 | 300· | 330· | 2·9493 | 1·81 | ... | 11 |
| 15 | 263· | 285· | ·8162 | 1·52 | ... | 9 |
| 16 | 220· | 234· | ·6595 | 1·25 | ... | 8 |
| 17 | 170· | 178· | ·4733 | ·99 | ... | 6 |
| 18 | 115· | 119· | ·2495 | ·75 | ... | 5 |
| 19 | 57·7 | 58·9 | 1·9767 | ·50 | ... | 3 |
| 20 | 14·73 | 14·89 | ·6377 | ·19 | ... | 1 |

TABLE IX. (continued).—*Giving the values of Contingent Reversionary Benefits to the Sons of Members in the event of their becoming fatherless, at 8 per cent. interest and 5 per cent. interest respectively; together with the value of the Additional Subscriptions payable by the Father at 5 per cent. interest.*

**Born in year following 50 years from Entry.**

| Age of Son last Birthday. | VALUE OF SON'S BENEFIT. | | INTEREST AT 5 PER CENT. | | | |
|---|---|---|---|---|---|---|
| | 8 per cent. Interest. | 5 per cent. Interest. | Joint Life, log D. | Value of Joint Life Annuity (until Son attains 21). *(See Chap. VII.)* | Value of Subscription (until Son attains 21). | |
| | | | | | In Active Service. | Retired. |
| | £ | £ | | | Rs. | Rs. |
| 0 | 410· | 572· | 4·0000 | 4·12 | ... | 26 |
| 1 | 457· | 624· | 3·9046 | 4·07 | ... | 25 |
| 2 | 490· | 655· | ·8199 | 3·88 | ... | 24 |
| 3 | 513· | 672· | ·7472 | 3·61 | ... | 23 |
| 4 | 531· | 682· | ·6708 | 3·32 | ... | 21 |
| 5 | 543· | 685· | ·5901 | 3·03 | ... | 19 |
| 6 | 552· | 683· | ·5028 | 2·73 | ... | 17 |
| 7 | 557· | 676· | ·4077 | 2·43 | ... | 15 |
| 8 | 556· | 664· | ·3040 | 2·13 | ... | 13 |
| 9 | 551· | 646· | ·1899 | 1·82 | ... | 11 |
| 10 | 538· | 621· | ·0580 | 1·53 | ... | 10 |
| 11 | 518· | 588· | 2·9017 | 1·26 | ... | 8 |
| 12 | 490· | 548· | ·7160 | 1·01 | ... | 6 |
| 13 | 457· | 504· | ·4928 | ·79 | ... | 5 |
| 14 | 416· | 453· | ·2208 | ·57 | ... | 4 |
| 15 | 367· | 393· | 1·8830 | ·37 | ... | 2 |
| 16 | 300· | 316· | ·4519 | ·13 | ... | 1 |
| 17 | 260· | 271· | 0·8763 | ... | ... | ... |
| 18 | ... | ... | ... | ... | ... | ... |
| 19 | ... | ... | ... | ... | ... | ... |
| 20 | ... | ... | ... | ... | ... | ... |

TABLE X.—*Giving the values of Contingent Reversionary Benefits to the Daughters of Members in the event of their becoming fatherless, at 8 per cent. interest and 5 per cent. interest respectively; together with the value of the Additional Subscription payable by the Father at 5 per cent. interest.*

**Born in year following 0 years from Entry.**

| Age of Daughter last Birthday. | Value of Benefits. | | Interest at 5 per cent. | | | |
|---|---|---|---|---|---|---|
| | At 8 per cent. Interest. | At 5 per cent. Interest. | Log D. | Value of Annuity to cease at Death of either or Marriage of Daughter. *(See Chap. VII.)* | Value of Subscription. | |
| | | | | | Active. | Retired. |
| | £ | £ | | | Rs. | Rs. |
| 0 | 112 | 206 | 4·0000 | 11·10 | 293 | 6 |
| 1 | 122 | 221 | 3·9402 | 11·66 | 323 | 7 |
| 2 | 128 | 228 | ·8913 | 11·99 | 347 | 7 |
| 3 | 131 | 231 | ·8582 | 11·90 | 360 | 8 |
| 4 | 134 | 232 | ·8275 | 11·74 | 370 | 8 |
| 5 | 135 | 232 | ·7982 | 11·52 | 378 | 9 |
| 6 | 135 | 230 | ·7692 | 11·28 | 385 | 10 |
| 7 | 135 | 228 | ·7402 | 11·03 | 391 | 10 |
| 8 | 133 | 224 | ·7111 | 10·76 | 397 | 11 |
| 9 | 131 | 220 | ·6824 | 10·46 | 401 | 12 |
| 10 | 129 | 216 | ·6538 | 10·14 | 404 | 13 |
| 11 | 126 | 211 | ·6251 | 9·80 | 405 | 14 |
| 12 | 123 | 205 | ·5962 | 9·44 | 404 | 14 |
| 13 | 119 | 200 | ·5672 | 9·05 | 400 | 15 |
| 14 | 116 | 195 | ·5379 | 8·65 | 394 | 17 |
| 15 | 112 | 190 | ·5082 | 8·23 | 384 | 18 |
| 16 | 109 | 186 | ·4779 | 7·79 | 370 | 19 |
| 17 | 108 | 185 | ·4429 | 7·40 | 353 | 21 |
| 18 | 109 | 188 | ·4029 | 7·06 | 333 | 23 |
| 19 | 114 | 196 | ·3491 | 6·93 | 318 | 26 |
| 20 | 121 | 210 | ·2855 | 6·95 | 306 | 30 |
| 21 | 130 | 228 | ·2143 | 7·09 | 296 | 35 |
| 22 | 140 | 246 | ·1450 | 7·23 | 279 | 41 |
| 23 | 151 | 265 | ·0779 | 7·36 | 256 | 48 |
| 24 | 162 | 285 | ·0120 | 7·48 | 226 | 56 |
| 25 | 174 | 306 | 2·9476 | 7·60 | 193 | 63 |
| 26 | 187 | 327 | ·8846 | 7·71 | 163 | 70 |
| 27 | 200 | 349 | ·8231 | 7·80 | 137 | 77 |
| 28 | 215 | 374 | ·7639 | 7·87 | 113 | 82 |
| 29 | 230 | 399 | ·6077 | 8·09 | 94 | 88 |
| 30 | 243 | 420 | ·6433 | 8·10 | 76 | 91 |
| 31 | 257 | 440 | ·5902 | 8·09 | 60 | 93 |
| 32 | 271 | 461 | ·5379 | 8·06 | 47 | 95 |
| 33 | 285 | 481 | ·4864 | 8·01 | 36 | 96 |
| 34 | 299 | 502 | ·4352 | 7·95 | 26 | 96 |
| 35 | 313 | 522 | ·3842 | 7·88 | 17 | 96 |
| 36 | 328 | 542 | ·3334 | 7·79 | 10 | 96 |
| 37 | 344 | 563 | ·2828 | 7·70 | 5 | 96 |
| 38 | 360 | 584 | ·2324 | 7·58 | 2 | 94 |
| 39 | 376 | 604 | ·1822 | 7·45 | 1 | 93 |
| 40 | 392 | 623 | ·1320 | 7·30 | ... | 91 |
| 41 | 407 | 642 | ·0816 | 7·13 | ... | 89 |
| 42 | 422 | 659 | ·0309 | 6·95 | ... | 87 |
| 43 | 438 | 675 | 1·9804 | 6·75 | ... | 84 |
| 44 | 454 | 692 | ·9289 | 6·54 | ... | 82 |
| 45 | 480 | 708 | ·8760 | 6·32 | ... | 79 |
| 46 | 486 | 724 | ·8221 | 6·09 | ... | 76 |
| 47 | 502 | 739 | ·7680 | 5·88 | ... | 73 |
| 48 | 519 | 754 | ·7125 | 5·56 | ... | 69 |
| 49 | 536 | 768 | ·6557 | 5·26 | ... | 66 |
| 50 | 551 | 780 | ·5961 | 4·96 | ... | 62 |
| 51 | 565 | 789 | ·5333 | 4·66 | ... | 58 |
| 52 | 579 | 796 | ·4660 | 4·35 | ... | 54 |
| 53 | 592 | 803 | ·3933 | 4·06 | ... | 51 |
| 54 | 604 | 809 | ·3145 | 3·76 | ... | 47 |
| 55 | 616 | 814 | ·2289 | 3·48 | ... | 43 |
| 56 | 629 | 818 | ·1353 | 3·19 | ... | 40 |
| 57 | 642 | 821 | ·0328 | 2·91 | ... | 36 |
| 58 | 657 | 825 | 0·9200 | 2·62 | ... | 33 |
| 59 | 675 | 828 | ·7955 | 2·33 | ... | 29 |
| 60 | 695 | 829 | ·6509 | 2·05 | ... | 26 |
| 61 | 724 | 826 | ·4812 | 1·79 | ... | 22 |
| 62 | 704 | 822 | ·2805 | 1·55 | ... | 19 |
| 63 | 667 | 815 | ·0399 | 1·32 | ... | 17 |
| 64 | 667 | 806 | $\bar{1}$·7466 | 1·12 | ... | 14 |
| 65 | 664 | 796 | ·3822 | ·93 | ... | 12 |
| 66 | 661 | 785 | $\bar{2}$·9148 | ·76 | ... | 10 |
| 67 | 667 | 785 | ·2831 | ·61 | ... | 8 |
| 68 | 675 | 791 | $\bar{3}$·3127 | ·50 | ... | 6 |

TABLE X. (continued).—*Giving the values of Contingent Reversionary Benefits to the Daughters of Members in the event of their becoming fatherless, at 8 per cent. interest and 5 per cent. interest respectively; together with the value of the Additional Subscription payable by the Father at 5 per cent. interest.*

**Born in year following 5 years from Entry.**

| Age of Daughter last Birthday. | Value of Benefits. | | Interest at 5 per cent. | | | |
|---|---|---|---|---|---|---|
| | At 8 per cent. Interest. | At 5 per cent. Interest. | Log D. | Value of Annuity to cease at Death of either or Marriage of Daughter. *(See Chap. VII.)* | Value of Subscription. Active. | Retired. |
| | £ | £ | | | Rs. | Rs. |
| 0 | 125 | 227 | 4·0000 | 10·90 | 368 | 10 |
| 1 | 135 | 243 | 3·9395 | 11·45 | 403 | 12 |
| 2 | 142 | 251 | ·8899 | 11·78 | 431 | 13 |
| 3 | 145 | 254 | ·8559 | 11·70 | 445 | 14 |
| 4 | 146 | 255 | ·8243 | 11·54 | 456 | 15 |
| 5 | 147 | 253 | ·7940 | 11·34 | 464 | 16 |
| 6 | 148 | 251 | ·7642 | 11·11 | 470 | 18 |
| 7 | 147 | 249 | ·7344 | 10·86 | 474 | 19 |
| 8 | 145 | 245 | ·7048 | 10·59 | 476 | 20 |
| 9 | 143 | 241 | ·6755 | 10·30 | 476 | 22 |
| 10 | 141 | 237 | ·6464 | 9·97 | 471 | 23 |
| 11 | 139 | 233 | ·6172 | 9·64 | 462 | 25 |
| 12 | 136 | 228 | ·5880 | 9·27 | 446 | 26 |
| 13 | 134 | 224 | ·5588 | 8·88 | 424 | 28 |
| 14 | 131 | 220 | ·5293 | 8·47 | 396 | 30 |
| 15 | 129 | 216 | ·4994 | 8·04 | 365 | 32 |
| 16 | 128 | 214 | ·4688 | 7·59 | 329 | 35 |
| 17 | 127 | 214 | ·4334 | 7·19 | 293 | 38 |
| 18 | 129 | 219 | ·3929 | 6·84 | 254 | 42 |
| 19 | 136 | 230 | ·3383 | 6·69 | 217 | 47 |
| 20 | 147 | 248 | ·2737 | 6·69 | 182 | 54 |
| 21 | 159 | 270 | ·2013 | 6·81 | 155 | 60 |
| 22 | 172 | 292 | ·1306 | 6·92 | 130 | 66 |
| 23 | 186 | 315 | ·0618 | 7·02 | 108 | 72 |
| 24 | 201 | 340 | 2·9942 | 7·12 | 88 | 76 |
| 25 | 217 | 366 | ·9278 | 7·22 | 72 | 80 |
| 26 | 235 | 392 | ·8627 | 7.30 | 57 | 84 |
| 27 | 252 | 419 | ·7990 | 7·38 | 45 | 86 |
| 28 | 270 | 445 | ·7375 | 7·43 | 35 | 88 |
| 29 | 288 | 470 | ·6787 | 7·43 | 25 | 90 |
| 30 | 306 | 495 | ·6216 | 7·40 | 17 | 91 |
| 31 | 324 | 519 | ·5656 | 7·35 | 10 | 91 |
| 32 | 344 | 544 | ·5104 | 7·28 | 5 | 90 |
| 33 | 354 | 568 | ·4557 | 7·19 | 2 | 90 |
| 34 | 363 | 593 | ·4014 | 7·09 | 1 | 89 |
| 35 | 381 | 618 | ·3468 | 6·96 | ... | 87 |
| 36 | 400 | 643 | ·2920 | 6·84 | ... | 85 |
| 37 | 420 | 667 | ·2369 | 6·70 | ... | 84 |
| 38 | 439 | 693 | ·1815 | 6·54 | ... | 82 |
| 39 | 459 | 717 | ·1258 | 6·36 | ... | 80 |
| 40 | 479 | 741 | ·0697 | 6·17 | ... | 77 |
| 41 | 500 | 764 | ·0130 | 5·96 | ... | 75 |
| 42 | 521 | 787 | 1·9556 | 5·73 | ... | 72 |
| 43 | 542 | 809 | ·8981 | 5·48 | ... | 68 |
| 44 | 564 | 832 | ·8391 | 5·20 | ... | 65 |
| 45 | 586 | 853 | ·7766 | 4·93 | ... | 62 |
| 46 | 606 | 871 | ·7105 | 4·66 | ... | 58 |
| 47 | 625 | 888 | ·6413 | 4·37 | ... | 55 |
| 48 | 643 | 902 | ·5673 | 4·09 | ... | 51 |
| 49 | 660 | 914 | ·4880 | 3·82 | ... | 48 |
| 50 | 674 | 925 | ·4029 | 3·53 | ... | 44 |
| 51 | 687 | 934 | ·3112 | 3·24 | ... | 41 |
| 52 | 701 | 941 | ·2110 | 2·96 | ... | 37 |
| 53 | 715 | 948 | ·1009 | 2·66 | ... | 33 |
| 54 | 728 | 954 | 0·9792 | 2·37 | ... | 30 |
| 55 | 738 | 958 | ·8380 | 2·08 | ... | 26 |
| 56 | 748 | 959 | ·6723 | 1·82 | ... | 23 |
| 57 | 754 | 958 | ·4759 | 1·57 | ... | 20 |
| 58 | 758 | 954 | ·2403 | 1·35 | ... | 17 |
| 59 | 760 | 948 | 1·9535 | 1·14 | ... | 14 |
| 60 | 754 | 940 | ·5973 | ·95 | ... | 12 |
| 61 | 755 | 930 | ·1422 | ·77 | ... | 10 |
| 62 | 767 | 929 | 2·5303 | ·62 | ... | 8 |
| 63 | 774 | 934 | 3·6071 | ·50 | ... | 6 |

TABLE X. (continued).—*Giving the values of Contingent Reversionary Benefits to the Daughters of Members in the event of their becoming fatherless, at 8 per cent. interest and 5 per cent. interest respectively; together with the value of the Additional Subscription payable by the Father at 5 per cent. interest.*

**Born in year following 10 years from Entry.**

| Age of Daughter last Birthday. | Value of Benefits. | | Interest at 5 per cent. | | | |
|---|---|---|---|---|---|---|
| | At 8 per cent. Interest. | At 5 per cent. Interest. | Log D. | Value of Annuity to cease at Death of either or Marriage of Daughter. (See Chap. VII.) | Value of Subscription. | |
| | | | | | Active. | Retired. |
| | £ | £ | | | Rs. | Rs. |
| 0 | 135 | 240 | 4·0000 | 10·69 | 428 | 19 |
| 1 | 147 | 266 | 3·9385 | 11·24 | 466 | 22 |
| 2 | 154 | 275 | ·8881 | 11·56 | 493 | 25 |
| 3 | 157 | 278 | ·8536 | 11·47 | 502 | 27 |
| 4 | 160 | 279 | ·8214 | 11·32 | 507 | 29 |
| 5 | 161 | 280 | ·7906 | 11·11 | 507 | 32 |
| 6 | 161 | 278 | ·7603 | 10·88 | 501 | 34 |
| 7 | 162 | 276 | ·7303 | 10·62 | 489 | 36 |
| 8 | 162 | 274 | ·7004 | 10·34 | 471 | 39 |
| 9 | 161 | 272 | ·6709 | 10·04 | 447 | 42 |
| 10 | 160 | 269 | ·6416 | 9·70 | 418 | 44 |
| 11 | 158 | 266 | ·6122 | 9·34 | 386 | 48 |
| 12 | 157 | 262 | ·5826 | 8·97 | 349 | 51 |
| 13 | 155 | 259 | ·5528 | 8·57 | 307 | 54 |
| 14 | 153 | 254 | ·5226 | 8·15 | 260 | 58 |
| 15 | 151 | 252 | ·4918 | 7·71 | 213 | 62 |
| 16 | 150 | 250 | ·4601 | 7·26 | 171 | 64 |
| 17 | 150 | 250 | ·4234 | 6·86 | 136 | 65 |
| 18 | 153 | 256 | ·3813 | 6·51 | 107 | 65 |
| 19 | 161 | 270 | ·3250 | 6·34 | 85 | 67 |
| 20 | 178 | 291 | ·2584 | 6·30 | 68 | 69 |
| 21 | 187 | 316 | ·1839 | 6·39 | 55 | 72 |
| 22 | 203 | 342 | ·1108 | 6·47 | 43 | 75 |
| 23 | 219 | 369 | ·0397 | 6·53 | 33 | 77 |
| 24 | 237 | 398 | 2·9695 | 6·59 | 24 | 79 |
| 25 | 255 | 428 | ·9003 | 6·64 | 16 | 81 |
| 26 | 275 | 460 | ·8323 | 6·68 | 10 | 82 |
| 27 | 295 | 491 | ·7655 | 6·71 | 5 | 83 |
| 28 | 316 | 522 | ·7009 | 6·71 | 2 | 84 |
| 29 | 336 | 553 | ·6388 | 6·66 | 1 | 83 |
| 30 | 356 | 582 | ·5781 | 6·58 | ... | 82 |
| 31 | 377 | 612 | ·5181 | 6·48 | ... | 81 |
| 32 | 398 | 641 | ·4583 | 6·37 | ... | 80 |
| 33 | 420 | 670 | ·3987 | 6·23 | ... | 78 |
| 34 | 442 | 700 | ·3386 | 6·08 | ... | 76 |
| 35 | 465 | 730 | ·2781 | 5·92 | ... | 74 |
| 36 | 489 | 761 | ·2170 | 5·74 | ... | 72 |
| 37 | 515 | 792 | ·1552 | 5·53 | ... | 69 |
| 38 | 541 | 823 | ·0927 | 5·31 | ... | 66 |
| 39 | 568 | 854 | ·0294 | 5·07 | ... | 63 |
| 40 | 594 | 884 | 1·9635 | 4·82 | ... | 60 |
| 41 | 619 | 911 | ·8945 | 4·56 | ... | 57 |
| 42 | 643 | 936 | ·8219 | 4·30 | ... | 54 |
| 43 | 666 | 959 | ·7457 | 4·03 | ... | 50 |
| 44 | 689 | 981 | ·6641 | 3·76 | ... | 47 |
| 45 | 712 | 1002 | ·5759 | 3·50 | ... | 44 |
| 46 | 733 | 1020 | ·4807 | 3·23 | ... | 40 |
| 47 | 753 | 1037 | ·3785 | 2·96 | ... | 37 |
| 48 | 773 | 1052 | ·2670 | 2·68 | ... | 33 |
| 49 | 792 | 1065 | ·1448 | 2·38 | ... | 30 |
| 50 | 807 | 1074 | ·0041 | 2·10 | ... | 26 |
| 51 | 819 | 1078 | 0·8406 | 1·84 | ... | 23 |
| 52 | 829 | 1080 | ·6471 | 1·59 | ... | 20 |
| 53 | 837 | 1079 | ·4150 | 1·36 | ... | 17 |
| 54 | 843 | 1076 | ·1323 | 1·15 | ... | 14 |
| 55 | 846 | 1071 | $\bar{1}$·7816 | ·96 | ... | 12 |
| 56 | 848 | 1064 | ·3334 | ·78 | ... | 10 |
| 57 | 855 | 1064 | $\bar{2}$·7324 | ·63 | ... | 8 |
| 58 | 862 | 1068 | $\bar{3}$·8328 | ·50 | ... | 6 |

TABLE X. (continued).—*Giving the values of Contingent Reversionary Benefits to the Daughters of Members in the event of their becoming fatherless, at 8 per cent. interest and 5 per cent. interest respectively; together with the value of the Additional Subscription payable by the Father at 5 per cent. interest.*

**Born in year following 15 years from Entry.**

| Age of Daughter last Birthday. | Value of Benefits. | | Interest at 5 per cent. | | | |
|---|---|---|---|---|---|---|
| | At 8 per cent. Interest. | At 5 per cent. Interest. | Log D. | Value of Annuity to cease at Death of either or Marriage of Daughter. (*See Chap. VII.*) | Value of Subscription. | |
| | | | | | Active. | Retired. |
| | £ | £ | | | Rs. | Rs. |
| 0 | 150 | 276 | 4·0000 | 10·49 | 454 | 35 |
| 1 | 163 | 296 | 3·9380 | 10·98 | 480 | 40 |
| 2 | 172 | 308 | ·8872 | 11·28 | 490 | 45 |
| 3 | 177 | 313 | ·8524 | 11·18 | 477 | 48 |
| 4 | 181 | 316 | ·8201 | 11·00 | 457 | 52 |
| 5 | 184 | 317 | ·7891 | 10·78 | 431 | 56 |
| 6 | 186 | 318 | ·7585 | 10·53 | 400 | 60 |
| 7 | 188 | 319 | ·7280 | 10·26 | 365 | 65 |
| 8 | 189 | 318 | ·6976 | 9·96 | 325 | 69 |
| 9 | 190 | 317 | ·6674 | 9·65 | 279 | 74 |
| 10 | 190 | 315 | ·6372 | 9·30 | 233 | 79 |
| 11 | 189 | 312 | ·6067 | 8·95 | 193 | 82 |
| 12 | 188 | 308 | ·5758 | 8·57 | 158 | 83 |
| 13 | 186 | 304 | ·5445 | 8·17 | 127 | 83 |
| 14 | 184 | 301 | ·5127 | 7·75 | 101 | 82 |
| 15 | 182 | 297 | ·4801 | 7·32 | 79 | 80 |
| 16 | 181 | 295 | ·4465 | 6·87 | 61 | 78 |
| 17 | 181 | 295 | ·4077 | 6·46 | 46 | 75 |
| 18 | 184 | 302 | ·3634 | 6·11 | 34 | 72 |
| 19 | 194 | 318 | ·3046 | 5·91 | 24 | 71 |
| 20 | 209 | 342 | ·2353 | 5·85 | 16 | 71 |
| 21 | 227 | 371 | ·1578 | 5·90 | 9 | 73 |
| 22 | 245 | 402 | ·0817 | 5·93 | 5 | 74 |
| 23 | 265 | 434 | ·0074 | 5·95 | 2 | 74 |
| 24 | 287 | 468 | 2·9337 | 5·95 | 1 | 74 |
| 25 | 311 | 504 | ·8608 | 5·95 | ... | 74 |
| 26 | 335 | 541 | ·7887 | 5·94 | ... | 74 |
| 27 | 359 | 579 | ·7173 | 5·91 | ... | 74 |
| 28 | 384 | 615 | ·6475 | 5·85 | ... | 73 |
| 29 | 409 | 650 | ·5798 | 5·76 | ... | 72 |
| 30 | 434 | 685 | ·5130 | 5·63 | ... | 70 |
| 31 | 460 | 720 | ·4466 | 5·48 | ... | 68 |
| 32 | 487 | 756 | ·3800 | 5·30 | ... | 66 |
| 33 | 515 | 792 | ·3131 | 5·10 | ... | 64 |
| 34 | 545 | 829 | ·2454 | 4·88 | ... | 61 |
| 35 | 575 | 865 | ·1750 | 4·65 | ... | 58 |
| 36 | 604 | 901 | ·1014 | 4·41 | ... | 55 |
| 37 | 633 | 935 | ·0242 | 4·17 | ... | 52 |
| 38 | 662 | 967 | 1·9428 | 3·93 | ... | 49 |
| 39 | 690 | 998 | ·8567 | 3·68 | ... | 46 |
| 40 | 717 | 1028 | ·7650 | 3·43 | ... | 43 |
| 41 | 744 | 1055 | ·6667 | 3·18 | ... | 40 |
| 42 | 769 | 1080 | ·5609 | 2·92 | ... | 36 |
| 43 | 794 | 1103 | ·4470 | 2·64 | ... | 33 |
| 44 | 819 | 1126 | ·3223 | 2·35 | ... | 29 |
| 45 | 843 | 1146 | ·1781 | 2·08 | ... | 26 |
| 46 | 864 | 1163 | ·0104 | 1·83 | ... | 23 |
| 47 | 882 | 1175 | 0·8144 | 1·59 | ... | 20 |
| 48 | 896 | 1183 | ·5804 | 1·36 | ... | 17 |
| 49 | 908 | 1188 | ·2970 | 1·15 | ... | 14 |
| 50 | 916 | 1188 | 1·9472 | ·96 | ... | 12 |
| 51 | 921 | 1185 | ·5032 | ·79 | ... | 10 |
| 52 | 929 | 1185 | 2·9093 | ·63 | ... | 8 |
| 53 | 936 | 1189 | ·0254 | ·50 | ... | 6 |

TABLE X. (continued).—*Giving the values of Contingent Reversionary Benefits to the Daughters of Members in the event of their becoming fatherless, at 8 per cent. interest and 5 per cent. interest respectively; together with the value of the Additional Subscription payable by the Father at 5 per cent. interest.*

**Born in year following 20 years from Entry.**

| Age of Daughter last Birthday. | VALUE OF BENEFITS. | | INTEREST AT 5 PER CENT. | | | |
|---|---|---|---|---|---|---|
| | At 8 per cent. Interest. | At 5 per cent. Interest. | Log D. | Value of Annuity to cease at Death of either or Marriage of Daughter. *(See Chap. VII.)* | Value of Subscription. Active. | Retired. |
| | £ | £ | | | Rs. | Rs. |
| 0 | 173 | 316 | 4·0000 | 10·10 | 385 | 56 |
| 1 | 189 | 341 | 3·9378 | 10·58 | 380 | 65 |
| 2 | 201 | 356 | ·8867 | 10·84 | 361 | 73 |
| 3 | 208 | 364 | ·8514 | 10·72 | 324 | 79 |
| 4 | 214 | 369 | ·8183 | 10·53 | 281 | 85 |
| 5 | 219 | 372 | ·7864 | 10·29 | 236 | 91 |
| 6 | 223 | 375 | ·7548 | 10·03 | 196 | 95 |
| 7 | 226 | 376 | ·7230 | 9·75 | 161 | 97 |
| 8 | 227 | 376 | ·6910 | 9·46 | 131 | 99 |
| 9 | 228 | 374 | ·6592 | 9·14 | 106 | 99 |
| 10 | 229 | 372 | ·6272 | 8·81 | 84 | 98 |
| 11 | 229 | 369 | ·5947 | 8·45 | 66 | 97 |
| 12 | 227 | 365 | ·5617 | 8·08 | 51 | 94 |
| 13 | 225 | 361 | ·5283 | 7·68 | 38 | 91 |
| 14 | 223 | 356 | ·4941 | 7·27 | 27 | 88 |
| 15 | 221 | 351 | ·4590 | 6·85 | 18 | 83 |
| 16 | 219 | 348 | ·4227 | 6·40 | 10 | 79 |
| 17 | 220 | 348 | ·3811 | 5·99 | 5 | 74 |
| 18 | 225 | 357 | ·3338 | 5·62 | 2 | 70 |
| 19 | 237 | 376 | ·2717 | 5·41 | 1 | 68 |
| 20 | 255 | 405 | ·1987 | 5·31 | ... | 66 |
| 21 | 277 | 439 | ·1170 | 5·30 | ... | 66 |
| 22 | 300 | 475 | ·0362 | 5·29 | ... | 66 |
| 23 | 325 | 513 | 2·9566 | 5·25 | ... | 66 |
| 24 | 352 | 553 | ·8772 | 5·20 | ... | 65 |
| 25 | 380 | 595 | ·7982 | 5·14 | | 64 |
| 26 | 410 | 639 | ·7195 | 5·06 | ... | 63 |
| 27 | 442 | 683 | ·6412 | 4·96 | ... | 62 |
| 28 | 474 | 728 | ·5640 | 4·83 | ... | 60 |
| 29 | 507 | 771 | ·4885 | 4·66 | ... | 58 |
| 30 | 538 | 812 | ·4117 | 4·46 | ... | 56 |
| 31 | 570 | 853 | ·3328 | 4·25 | ... | 53 |
| 32 | 601 | 892 | ·2507 | 4·03 | ... | 50 |
| 33 | 632 | 930 | ·1649 | 3·80 | ... | 47 |
| 34 | 663 | 967 | ·0741 | 3·57 | ... | 45 |
| 35 | 694 | 1003 | 1·9775 | 3·33 | ... | 42 |
| 36 | 725 | 1039 | ·8743 | 3·09 | ... | 39 |
| 37 | 756 | 1074 | ·7635 | 2·84 | ... | 36 |
| 38 | 787 | 1108 | ·6439 | 2·59 | ... | 32 |
| 39 | 819 | 1141 | ·5141 | 2·31 | ... | 29 |
| 40 | 848 | 1170 | ·3659 | 2·05 | ... | 26 |
| 41 | 874 | 1196 | ·1945 | 1·80 | ... | 23 |
| 42 | 897 | 1217 | 0·9940 | 1·57 | ... | 20 |
| 43 | 916 | 1233 | ·7568 | 1·35 | ... | 17 |
| 44 | 934 | 1246 | ·4697 | 1·14 | ... | 14 |
| 45 | 951 | 1259 | ·1142 | ·95 | ... | 12 |
| 46 | 965 | 1267 | $\bar{1}$·6623 | ·78 | ... | 10 |
| 47 | 982 | 1280 | ·0622 | ·63 | ... | 8 |
| 48 | 994 | 1291 | $\bar{2}$·1697 | ·50 | ... | 6 |

TABLE X. (continued).—*Giving the values of Contingent Reversionary Benefits to the Daughters of Members in the event of their becoming fatherless, at 8 per cent. interest and 5 per cent. interest respectively; together with the value of the Additional Subscription payable by the Father at 5 per cent. interest.*

**Born in year following 25 years from Entry.**

| Age of Daughter last Birthday. | VALUE OF BENEFITS. | | INTEREST AT 5 PER CENT. | | | |
|---|---|---|---|---|---|---|
| | At 8 per cent. Interest. | At 5 per cent. Interest. | Log D. | Value of Annuity to cease at Death of either or Marriage of Daughter. *(See Chap. VII.)* | Value of Subscription. Active. | Value of Subscription. Retired. |
| | £ | £ | | | Rs. | Rs. |
| 0 | 205 | 369 | 4·0000 | 9·60 | 212 | 86 |
| 1 | 226 | 400 | 3·9366 | 10·03 | 186 | 96 |
| 2 | 241 | 419 | ·8841 | 10·26 | 159 | 104 |
| 3 | 250 | 429 | ·8472 | 10·12 | 130 | 107 |
| 4 | 258 | 436 | ·8125 | 9·92 | 105 | 109 |
| 5 | 264 | 441 | ·7788 | 9·68 | 84 | 109 |
| 6 | 269 | 444 | ·7452 | 9·42 | 66 | 109 |
| 7 | 273 | 446 | ·7114 | 9·14 | 51 | 108 |
| 8 | 276 | 447 | ·6773 | 8·85 | 38 | 106 |
| 9 | 278 | 445 | ·6431 | 8·53 | 27 | 103 |
| 10 | 279 | 443 | ·6085 | 8·20 | 18 | 100 |
| 11 | 279 | 439 | ·5734 | 7·85 | 10 | 97 |
| 12 | 278 | 435 | ·5377 | 7·48 | 5 | 93 |
| 13 | 276 | 431 | ·5013 | 7·08 | 2 | 88 |
| 14 | 274 | 425 | ·4640 | 6·67 | 1 | 83 |
| 15 | 272 | 420 | ·4254 | 6·25 | ... | 78 |
| 16 | 271 | 416 | ·3853 | 5·80 | ... | 73 |
| 17 | 271 | 416 | ·3393 | 5·40 | ... | 67 |
| 18 | 277 | 425 | ·2870 | 5·02 | ... | 63 |
| 19 | 292 | 447 | ·2192 | 4·79 | ... | 60 |
| 20 | 315 | 481 | ·1400 | 4·65 | ... | 58 |
| 21 | 342 | 522 | ·0515 | 4·58 | ... | 57 |
| 22 | 372 | 565 | 2·9635 | 4·50 | ... | 56 |
| 23 | 404 | 612 | ·8763 | 4·39 | ... | 55 |
| 24 | 439 | 660 | ·7888 | 4·26 | ... | 53 |
| 25 | 475 | 710 | ·6995 | 4·12 | ... | 51 |
| 26 | 512 | 760 | ·6079 | 3·97 | ... | 50 |
| 27 | 549 | 811 | ·5136 | 3·81 | ... | 48 |
| 28 | 586 | 859 | ·4169 | 3·63 | ... | 45 |
| 29 | 620 | 903 | ·3179 | 3·44 | ... | 43 |
| 30 | 654 | 945 | ·2146 | 3·23 | ... | 40 |
| 31 | 687 | 986 | ·1056 | 3·00 | ... | 38 |
| 32 | 721 | 1027 | 1·9895 | 2·77 | ... | 35 |
| 33 | 755 | 1067 | ·8650 | 2·52 | ... | 32 |
| 34 | 789 | 1106 | ·7301 | 2·26 | ... | 28 |
| 35 | 822 | 1143 | ·5764 | 2·01 | ... | 25 |
| 36 | 853 | 1177 | ·3993 | 1·77 | ... | 22 |
| 37 | 879 | 1208 | ·1926 | 1·54 | ... | 19 |
| 38 | 906 | 1236 | 0·9479 | 1·33 | ... | 17 |
| 39 | 933 | 1261 | ·6534 | 1·13 | ... | 14 |
| 40 | 955 | 1282 | ·2914 | ·94 | ... | 12 |
| 41 | 975 | 1301 | 1·8324 | ·77 | ... | 10 |
| 42 | 1001 | 1328 | ·2208 | ·62 | ... | 8 |
| 43 | 1017 | 1345 | 2·3133 | ·50 | ... | 6 |

TABLE X. (continued).—*Giving the values of Contingent Reversionary Benefits to the Daughters of Members in the event of their becoming fatherless, at 8 per cent. interest and 5 per cent. interest respectively; together with the value of the Additional Subscription payable by the Father at 5 per cent. interest.*

**Born in year following 30 years from Entry.**

| Age of Daughter last Birthday. | VALUE OF BENEFITS. | | INTEREST AT 5 PER CENT. | | | |
|---|---|---|---|---|---|---|
| | At 8 per cent. Interest. | At 5 per cent. Interest. | Log D. | Value of Annuity to cease at Death of either or Marriage of Daughter. *(See Chap. VII.)* | Value of Subscription. | |
| | | | | | Active. | Retired. |
| | £ | £ | | | Rs. | Rs. |
| 0 | 247 | 437 | 4·0000 | 8·96 | 76 | 102 |
| 1 | 273 | 474 | 3·9345 | 9·34 | 63 | 108 |
| 2 | 291 | 498 | ·8798 | 9·53 | 50 | 113 |
| 3 | 303 | 510 | ·8408 | 9·37 | 38 | 112 |
| 4 | 313 | 519 | ·8037 | 9·17 | 27 | 111 |
| 5 | 322 | 526 | ·7674 | 8·92 | 18 | 109 |
| 6 | 333 | 531 | ·7311 | 8·66 | 10 | 107 |
| 7 | 339 | 534 | ·6945 | 8·37 | 5 | 104 |
| 8 | 340 | 535 | ·6574 | 8·08 | 2 | 101 |
| 9 | 343 | 536 | ·6201 | 7·76 | 1 | 97 |
| 10 | 345 | 534 | ·5821 | 7·42 | ... | 93 |
| 11 | 346 | 530 | ·5431 | 7·07 | ... | 88 |
| 12 | 346 | 526 | ·5030 | 6·71 | ... | 84 |
| 13 | 345 | 520 | ·1618 | 6·32 | ... | 79 |
| 14 | 343 | 513 | ·4191 | 5·92 | ... | 74 |
| 15 | 340 | 507 | ·3748 | 5·51 | ... | 69 |
| 16 | 339 | 502 | ·3286 | 5·07 | ... | 63 |
| 17 | 341 | 503 | ·2760 | 4·66 | ... | 58 |
| 18 | 350 | 515 | ·2166 | 4·27 | ... | 53 |
| 19 | 370 | 542 | ·1410 | 3·99 | ... | 50 |
| 20 | 399 | 582 | ·0515 | 3·79 | ... | 47 |
| 21 | 433 | 630 | 2·0498 | 3·65 | ... | 46 |
| 22 | 468 | 678 | ·8455 | 3·51 | ... | 44 |
| 23 | 504 | 728 | ·7384 | 3·35 | ... | 42 |
| 24 | 542 | 780 | ·6267 | 3·18 | ... | 40 |
| 25 | 582 | 832 | ·5100 | 3·01 | ... | 38 |
| 26 | 622 | 886 | ·3874 | 2·83 | ... | 35 |
| 27 | 664 | 939 | ·2580 | 2.64 | ... | 33 |
| 28 | 705 | 991 | ·1217 | 2·43 | ... | 30 |
| 29 | 744 | 1040 | 1·9776 | 2·20 | ... | 27 |
| 30 | 780 | 1083 | ·8162 | 1·96 | ... | 24 |
| 31 | 814 | 1123 | ·6322 | 1·73 | ... | 22 |
| 32 | 846 | 1160 | ·4189 | 1·51 | ... | 19 |
| 33 | 876 | 1194 | ·1676 | 1·30 | ... | 16 |
| 34 | 904 | 1226 | 0·8656 | 1·11 | ... | 14 |
| 35 | 930 | 1254 | ·4945 | ·93 | ... | 12 |
| 36 | 954 | 1282 | ·0243 | ·76 | ... | 10 |
| 37 | 990 | 1324 | $\bar{1}$·3967 | ·61 | ... | 8 |
| 38 | 1014 | 1353 | 2·4532 | ·50 | .. | 6 |

TABLE X. (continued).—*Giving the values of Contingent Reversionary Benefits to the Daughters of Members in the event of their becoming fatherless, at 8 per cent. interest and 5 per cent. interest respectively; together with the value of the Additional Subscription payable by the Father at 5 per cent. interest.*

**Born in year following 35 years from Entry.**

| Age of Daughter last Birthday. | Value of Benefits. | | Interest at 5 per cent. | | | |
|---|---|---|---|---|---|---|
| | At 8 per cent. Interest. | At 5 per cent. Interest. | Log D. | Value of Annuity to cease at Death of either or Marriage of Daughter. (*See Chap. VII.*) | Value of Subscription. | |
| | | | | | Active. | Retired. |
| | £ | £ | | | Rs. | Rs. |
| 0 | 300 | 519 | 4·0000 | 8·18 | 17 | 100 |
| 1 | 332 | 566 | 3·9316 | 8·49 | 10 | 105 |
| 2 | 356 | 595 | ·8740 | 8·63 | 5 | 107 |
| 3 | 372 | 612 | ·8320 | 8·45 | 2 | 105 |
| 4 | 386 | 625 | ·7918 | 8·22 | 1 | 103 |
| 5 | 398 | 635 | ·7521 | 7·96 | ... | 100 |
| 6 | 409 | 642 | ·7120 | 7·68 | ... | 96 |
| 7 | 418 | 648 | ·6710 | 7·40 | ... | 92 |
| 8 | 425 | 651 | ·6291 | 7·10 | ... | 89 |
| 9 | 431 | 652 | ·5864 | 6·78 | ... | 85 |
| 10 | 435 | 652 | ·5427 | 6·44 | ... | 80 |
| 11 | 438 | 649 | ·4976 | 6·09 | ... | 76 |
| 12 | 440 | 645 | ·4510 | 5·72 | ... | 72 |
| 13 | 441 | 641 | ·4029 | 5·34 | ... | 67 |
| 14 | 442 | 636 | ·3529 | 4·93 | ... | 62 |
| 15 | 441 | 628 | ·2991 | 4·51 | ... | 56 |
| 16 | 439 | 621 | ·2409 | 4·08 | ... | 51 |
| 17 | 440 | 618 | ·1733 | 3·69 | ... | 46 |
| 18 | 448 | 627 | ·0952 | 3·32 | ... | 41 |
| 19 | 468 | 653 | 2·9961 | 3·04 | ... | 38 |
| 20 | 499 | 695 | ·8792 | 2·82 | ... | 35 |
| 21 | 536 | 745 | ·7458 | 2·66 | ... | 33 |
| 22 | 575 | 797 | ·6056 | 2·48 | ... | 31 |
| 23 | 616 | 851 | ·4578 | 2·28 | ... | 29 |
| 24 | 659 | 906 | ·2997 | 2·07 | ... | 26 |
| 25 | 701 | 961 | ·1230 | 1·86 | ... | 23 |
| 26 | 744 | 1016 | 1·9228 | 1·65 | ... | 21 |
| 27 | 786 | 1060 | ·6928 | 1·45 | ... | 18 |
| 28 | 823 | 1117 | ·4256 | 1·26 | ... | 16 |
| 29 | 857 | 1158 | ·1101 | 1·08 | ... | 14 |
| 30 | 887 | 1194 | 0·7262 | ·91 | ... | 11 |
| 31 | 916 | 1229 | ·2423 | ·75 | ... | 9 |
| 32 | 959 | 1283 | $\bar{1}$·5969 | ·60 | ... | 8 |
| 33 | 987 | 1319 | $\bar{2}$·6192 | ·50 | ... | 6 |

TABLE X. (continued).—*Giving the values of Contingent Reversionary Benefits to the Daughters of Members in the event of their becoming fatherless, at 8 per cent. interest and 5 per cent. interest respectively; together with the value of the Additional Subscription payable by the Father at 5 per cent. interest.*

**Born in year following 40 years from Entry.**

| Age of Daughter last Birthday. | Value of Benefits. | | Interest at 5 per cent. | | | |
|---|---|---|---|---|---|---|
| | At 8 per cent. Interest. | At 5 per cent. Interest. | Log D. | Value of Annuity to cease at Death of either or Marriage of Daughter. (See Chap. VII.) | Value of Subscription. Active. | Retired. |
| | £ | £ | | | Rs. | Rs. |
| 0 | 366 | 619 | 4·0000 | 7·21 | ... | 90 |
| 1 | 407 | 678 | 3·9275 | 7·43 | ... | 93 |
| 2 | 438 | 716 | ·8653 | 7·49 | ... | 94 |
| 3 | 460 | 737 | ·8184 | 7·29 | ... | 91 |
| 4 | 480 | 756 | ·7728 | 7·04 | ... | 88 |
| 5 | 497 | 770 | ·7274 | 6·76 | ... | 85 |
| 6 | 512 | 782 | ·6812 | 6·47 | ... | 81 |
| 7 | 527 | 793 | ·6337 | 6·16 | ... | 77 |
| 8 | 541 | 801 | ·5849 | 5·83 | ... | 73 |
| 9 | 552 | 807 | ·5349 | 5·48 | ... | 68 |
| 10 | 561 | 809 | ·4817 | 5·13 | ... | 64 |
| 11 | 568 | 807 | ·4247 | 4·78 | ... | 60 |
| 12 | 570 | 802 | ·3633 | 4·43 | ... | 55 |
| 13 | 571 | 794 | ·2970 | 4·07 | ... | 51 |
| 14 | 568 | 783 | ·2248 | 3·72 | ... | 47 |
| 15 | 563 | 768 | ·1459 | 3·36 | ... | 42 |
| 16 | 557 | 755 | ·0591 | 3·00 | ... | 37 |
| 17 | 554 | 746 | 2·9586 | 2·65 | ... | 33 |
| 18 | 560 | 751 | ·8426 | 2·30 | ... | 29 |
| 19 | 582 | 777 | ·6985 | 2·01 | ... | 25 |
| 20 | 616 | 820 | ·5216 | 1·77 | ... | 22 |
| 21 | 656 | 872 | ·3084 | 1·58 | ... | 20 |
| 22 | 694 | 922 | ·0647 | 1·39 | ... | 17 |
| 23 | 732 | 972 | 1·7820 | 1·21 | ... | 15 |
| 24 | 770 | 1021 | ·4455 | 1·03 | ... | 13 |
| 25 | 806 | 1069 | ·0357 | ·87 | ... | 11 |
| 26 | 844 | 1118 | 0·5188 | ·72 | ... | 9 |
| 27 | 903 | 1196 | $\bar{1}$·8268 | ·58 | ... | 7 |
| 28 | 943 | 1249 | 2·7574 | ·50 | ... | 6 |

TABLE X. (continued).—*Giving the values of Contingent Reversionary Benefits to the Daughters of Members in the event of their becoming fatherless, at 8 per cent. interest and 5 per cent. interest respectively; together with the value of the Additional Subscription payable by the Father at 5 per cent. interest.*

**Born in year following 45 years from Entry.**

| Age of Daughter last Birthday. | Value of Benefits. | | Interest at 5 per cent. | | | |
|---|---|---|---|---|---|---|
| | At 8 per cent. Interest. | At 5 per cent. Interest. | Log D. | Value of Annuity to cease at Death of either or Marriage of Daughter. *(See Chap. VII.)* | Value of Subscription of ¼ per cent. on Salary. | |
| | | | | | Active. | Retired. |
| | £ | £ | | | Rs. | Rs. |
| 0 | 444 | 729 | 4·0000 | 6·04 | ... | 76 |
| 1 | 497 | 800 | 3·9209 | 6·15 | ... | 77 |
| 2 | 538 | 849 | ·8519 | 6·12 | ... | 77 |
| 3 | 569 | 881 | ·7980 | 5·86 | ... | 73 |
| 4 | 597 | 908 | ·7450 | 5·56 | ... | 70 |
| 5 | 622 | 930 | ·6900 | 5·25 | ... | 66 |
| 6 | 644 | 947 | ·6318 | 4·93 | ... | 62 |
| 7 | 664 | 961 | ·5695 | 4·61 | ... | 58 |
| 8 | 681 | 972 | ·5024 | 4·29 | ... | 54 |
| 9 | 694 | 977 | ·4302 | 3·98 | ... | 50 |
| 10 | 704 | 979 | ·3519 | 3·67 | ... | 46 |
| 11 | 711 | 976 | ·2664 | 3·36 | ... | 42 |
| 12 | 714 | 968 | ·1726 | 3·05 | ... | 38 |
| 13 | 715 | 959 | ·0694 | 2·73 | ... | 34 |
| 14 | 714 | 948 | 2·9551 | 2·40 | ... | 30 |
| 15 | 707 | 930 | ·8214 | 2·08 | ... | 26 |
| 16 | 698 | 910 | ·6636 | 1·78 | ... | 22 |
| 17 | 687 | 891 | ·4697 | 1·50 | ... | 19 |
| 18 | 684 | 882 | ·2298 | 1·24 | ... | 15 |
| 19 | 696 | 895 | 1·9142 | 1·02 | ... | 13 |
| 20 | 721 | 930 | ·5041 | ·84 | ... | 11 |
| 21 | 757 | 977 | $\bar{0}$·9599 | ·70 | ... | 9 |
| 22 | 821 | 1062 | $\bar{1}$·2269 | ·57 | ... | 7 |
| 23 | 866 | 1121 | $\bar{2}$·0477 | ·50 | ... | 6 |

TABLE X. (continued).—*Giving the values of Contingent Reversionary Benefits to the Daughters of Members in the event of their becoming fatherless, at 8 per cent. interest and 5 per cent. interest respectively; together with the value of the Additional Subscription payable by the Father at 5 per cent. interest.*

**Born in year following 50 years from Entry.**

| Age of Daughter last Birthday. | Value of Benefits. | | Interest at 5 per cent. | | | |
|---|---|---|---|---|---|---|
| | At 8 per cent. Interest. | At 5 per cent. Interest. | Log D. | Value of Annuity to cease at Death of either or Marriage of Daughter. *(See Chap. VII.)* | Value of Subscription of ¼ per cent. on Salary. | |
| | | | | | Active. | Retired. |
| | £ | £ | | | Rs. | Rs. |
| 0 | 526 | 835 | 4·0000 | 4·66 | ... | 58 |
| 1 | 590 | 821 | 3·9080 | 4·64 | ... | 58 |
| 2 | 641 | 980 | ·8234 | 4·53 | ... | 57 |
| 3 | 680 | 1018 | ·7511 | 4·26 | ... | 53 |
| 4 | 714 | 1050 | ·6758 | 3·97 | ... | 50 |
| 5 | 743 | 1075 | ·5956 | 3·67 | ... | 46 |
| 6 | 771 | 1096 | ·5088 | 3·38 | ... | 42 |
| 7 | 796 | 1115 | ·4140 | 3·08 | ... | 38 |
| 8 | 818 | 1129 | ·3100 | 2·78 | ... | 35 |
| 9 | 836 | 1137 | ·1957 | 2·47 | ... | 31 |
| 10 | 849 | 1140 | ·0628 | 2·17 | ... | 27 |
| 11 | 856 | 1136 | 2·9065 | 1·89 | ... | 24 |
| 12 | 856 | 1125 | ·7209 | 1·63 | ... | 20 |
| 13 | 853 | 1110 | ·4979 | 1·40 | ... | 17 |
| 14 | 846 | 1091 | ·2258 | 1·18 | ... | 15 |
| 15 | 833 | 1066 | 1·8872 | ·97 | ... | 12 |
| 16 | 818 | 1040 | ·4542 | ·78 | ... | 10 |
| 17 | 818 | 1035 | $\bar{0}$·8595 | ·62 | ... | 8 |
| 18 | 824 | 1041 | $\bar{1}$·9397 | ·50 | ... | 6 |

TABLE XI.—*Showing the value of the Contingent Benefits and Additional Subscriptions in respect of future Children of Bachelors; also the value of the Additional Subscriptions in respect of the future Wives of the said Bachelors.*

| Years completed from Entry. | Value of Children's Benefits. | | Interest at 5 per cent. | | | |
|---|---|---|---|---|---|---|
| | | | Value of Additional Subscriptions at 5 per cent. interest in respect of Children. | | Value of Additional Subscriptions at 5 per cent. interest in respect of Wives. | |
| | Interest at 8 per cent. | Interest at 5 per cent. | Active. | Retired. | Active. | Retired. |
| | £ | £ | Rs. | Rs. | Rs. | Rs. |
| 0 | 192 | 433 | 669 | 37 | 2276 | 168 |
| 1 | 197 | 442 | 682 | 40 | 2325 | 177 |
| 2 | 202 | 453 | 694 | 44 | 2374 | 187 |
| 3 | 208 | 463 | 702 | 48 | 2423 | 197 |
| 4 | 214 | 474 | 708 | 52 | 2469 | 208 |
| 5 | 220 | 485 | 712 | 57 | 2504 | 218 |
| 6 | 226 | 495 | 709 | 62 | 2530 | 230 |
| 7 | 232 | 504 | 703 | 67 | 2545 | 241 |
| 8 | 237 | 513 | 689 | 72 | 2547 | 252 |
| 9 | 242 | 521 | 668 | 77 | 2531 | 264 |
| 10 | 245 | 527 | 640 | 82 | 2483 | 274 |
| 11 | 245 | 526 | 594 | 86 | 2383 | 283 |
| 12 | 238 | 516 | 526 | 90 | 2200 | 288 |
| 13 | 233 | 508 | 458 | 93 | 2020 | 293 |
| 14 | 230 | 501 | 395 | 95 | 1843 | 298 |
| 15 | 224 | 492 | 334 | 96 | 1644 | 300 |
| 16 | 219 | 482 | 276 | 96 | 1443 | 302 |
| 17 | 214 | 473 | 226 | 96 | 1248 | 303 |
| 18 | 210 | 465 | 181 | 94 | 1066 | 303 |
| 19 | 207 | 458 | 145 | 93 | 904 | 303 |
| 20 | 207 | 454 | 115 | 92 | 770 | 304 |
| 21 | 208 | 454 | 95 | 91 | 666 | 306 |
| 22 | 210 | 453 | 76 | 89 | 567 | 306 |
| 23 | 211 | 451 | 63 | 87 | 475 | 305 |
| 24 | 211 | 447 | 51 | 84 | 389 | 301 |
| 25 | 210 | 441 | 39 | 81 | 313 | 294 |
| 26 | 208 | 432 | 30 | 77 | 250 | 284 |
| 27 | 205 | 422 | 22 | 73 | 196 | 271 |
| 28 | 200 | 407 | 17 | 67 | 151 | 255 |
| 29 | 193 | 389 | 13 | 62 | 114 | 237 |
| 30 | 184 | 367 | 9 | 56 | 83 | 216 |
| 31 | 172 | 341 | 6 | 49 | 57 | 192 |
| 32 | 159 | 312 | 4 | 43 | 38 | 169 |
| 33 | 146 | 283 | 3 | 37 | 24 | 147 |
| 34 | 131 | 253 | 2 | 31 | 14 | 126 |
| 35 | 117 | 222 | 1 | 26 | 8 | 105 |
| 36 | 101 | 190 | ·9 | 21 | 4 | 86 |
| 37 | 86 | 159 | ·4 | 17 | 1·4 | 69 |
| 38 | 70 | 128 | ·2 | 13 | ·4 | 53 |
| 39 | 54 | 98 | ... | 9 | ·08 | 39 |
| 40 | 39 | 69 | ... | 6 | ... | 26 |
| 41 | 25 | 43 | ... | 4 | ... | 16 |
| 42 | 12 | 20 | ... | 2 | ... | 7 |

NOTE.—*See* Chapter VIII., and Table XII. (Appendix).

TABLE XII.

*Contingent Benefits to Children (it being assumed that each marriage will, on the average, result in 5 children); also the value, at time of marriage, of the Corresponding Additional Subscription at 5 per cent.*

| Years completed from Entry. | Value of Children's benefits at time of Marriage. | | Value of Additional Subscriptions for future Children at time of Marriage. Interest at 5 per cent. | |
|---|---|---|---|---|
| | Interest at 6 per cent. | Interest at 5 per cent. | Active. | Retired. |
| | £ | £ | Rs. | Rs. |
| 0 | 331 | 629 | 996 | 22 |
| 1 | 334 | 637 | 1025 | 26 |
| 2 | 343 | 651 | 1084 | 29 |
| 3 | 348 | 661 | 1116 | 33 |
| 4 | 353 | 671 | 1125 | 40 |
| 5 | 358 | 682 | 1162 | 46 |
| 6 | 363 | 693 | 1171 | 54 |
| 7 | 370 | 706 | 1212 | 60 |
| 8 | 376 | 719 | 1223 | 69 |
| 9 | 384 | 735 | 1189 | 78 |
| 10 | 392 | 750 | 1202 | 88 |
| 11 | 401 | 769 | 1164 | 99 |
| 12 | 411 | 786 | 1179 | 110 |
| 13 | 423 | 807 | 1136 | 122 |
| 14 | 434 | 830 | 1061 | 135 |
| 15 | 448 | 854 | 1013 | 148 |
| 16 | 461 | 880 | 929 | 163 |
| 17 | 478 | 908 | 874 | 178 |
| 18 | 494 | 937 | 778 | 195 |
| 19 | 509 | 966 | 724 | 201 |
| 20 | 528 | 999 | 615 | 219 |
| 21 | 545 | 1031 | 554 | 226 |
| 22 | 568 | 1068 | 429 | 246 |
| 23 | 589 | 1104 | 360 | 254 |
| 24 | 606 | 1137 | 336 | 252 |
| 25 | 631 | 1177 | 257 | 260 |
| 26 | 652 | 1215 | 231 | 259 |
| 27 | 681 | 1260 | 141 | 268 |
| 28 | 706 | 1304 | 111 | 266 |
| 29 | 728 | 1344 | 110 | 260 |
| 30 | 758 | 1392 | 76 | 258 |
| 31 | 784 | 1438 | 71 | 252 |
| 32 | 821 | 1493 | 32 | 249 |
| 33 | 851 | 1546 | 25 | 242 |
| 34 | 875 | 1586 | 25 | 236 |
| 35 | 914 | 1646 | 18 | 227 |
| 36 | 942 | 1692 | 18 | 220 |
| 37 | 990 | 1761 | 10 | 210 |
| 38 | 1024 | 1814 | 10 | 202 |
| 39 | 1042 | 1843 | | 194 |
| 40 | 1085 | 1903 | | 185 |
| 41 | 1107 | 1935 | | 176 |
| 42 | 1161 | 2005 | | 165 |

N.B.—It is from this Table, and from Table V. (Appendix), that the values in Table XI. are calculated (*see* Chapter VIII.).